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FOSSIL BRYOZOA FROM THE PLEISTOCENE
OF SOUTHERN CALIFORNIA*

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INTRODUCTION

Except for the work of Gabb and Horn (1862), that of Canu and Bassler (1923), and the species listed in a paper by Clark (1931), little has been published with reference to the fossil Bryozoa of the Pacific coast of North America.

The Bryozoa reported in this paper have been assembled from various sources. Through the courtesy of Mr. George P. Kanakoff we were able to examine fossil material collected by the Section of Invertebrate Paleontology of the Los Angeles County Museum from a number of sites. Additional specimens were collected by the authors in San Pedro, California, and in Santa Barbara, California. The survey disclosed 56 species of Bryozoa of Pleistocene age. Of this number, 19 apparently are new to the fossil record, 10 have not been previously reported as part of the fossil fauna of the Pacific coast, and 4 are reported only as fossil and have not as yet been numbered among the living Bryozoa of the eastern Pacific waters.

For each species recorded we have established the following format:

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(1) The name of the species, author, date. (2) A limited synonymy, restricted to the original name, followed by previous eastern Pacific citations. (3) Brief description, and where applicable, measurements. (4) Locality or localities from which examined specimens were collected. (5) Occurrence, fossil and Recent records gathered from as many sources as were available. (6) Bathymetric range when available, including the number of records obtained. The age assignments are those of the original authors. For additional data, excellent descriptions, and illustrations, the monumental work of Osburn, *Bryozoa of the Pacific Coast of America*, 1950, 1952, and 1953, should be consulted.

ACKNOWLEDGMENTS

The authors wish to acknowledge their deep debt of gratitude to the late Dr. Raymond C. Osburn for his aid and encouragement during the preparation of this paper, and for the time and effort he so willingly spent in verifying the identification of our specimens. Also we express our appreciation to Dr. William K. Emerson of the American Museum of Natural History for many valuable suggestions during the preparation of the manuscript. Grateful acknowledgment is made to Dr. William Easton, Department of Geology, University of Southern California, for his help in initiating this study.

PHYLUM **BRYOZOA**

CLASS **ECTOPROCTA**

Order GYMNOLOEMATA

Sub-order CHEILOSTOMATA

ANASCA Levinsen, 1909

DIVISION I, **INOVICELLATA** Jullien, 1888

Within this division we have no fossil representatives to report.

DIVISION II, **MALACOSTEGA** Levinsen, 1909

Family MEMBRANIPORIDAE Busk, 1854

Genus **Membranipora** Blainville, 1830

Membranipora tuberculata (Bosc), 1802.

Flustra tuberculata Bosc, 1802, *partim*, Hist. Nat. Vers., vol. 3, no. 1, p. 118.

- Flustra tehuelcha* D'ORBIGNY, 1847, Voy. Amer. Mer., vol. 5, pt. 4, p. 17, pl. 8, figs. 10-14.
- Membranipora tehuelcha*, ROBERTSON, 1908, Univ. Calif. Pub. Zool., vol. 4, no. 5, p. 265, pl. 15, figs. 16, 17, pl. 16, fig. 18.
- Membranipora tuberculata*, CANU and BASSLER, 1923, U. S. Nat. Mus. Bull. 125, pp. 22, 23, pl. 33, figs. 3-5.
- Nichtina tuberculata*, HASTINGS, 1930, Proc. Zool. Soc. London, 1929, p. 706, pl. 3, figs. 9, 10.
- Membranipora tuberculata*, OSBURN, 1950, Allan Hancock Pac. Expds., vol. 14, no. 1, pp. 23, 24, pl. 2, figs. 4-6.

DESCRIPTION: Zoaria incrusting. Zooecia variable in proportions, large, elongate, alternate, surrounded by a calcareous border with 4-6 denticles. Opesia occupying about two-thirds of the front. Cryptocyst bearing a pair of thick rounded calcareous tubercles, that may fuse in the mid-line to form a plate.

LOCALITIES: LACMIP (Los Angeles County Museum, Invertebrate Paleontology) loc. 66-2, Newport Harbor Mesa, Newport, California, Pleistocene.

OCCURRENCE: *Pleistocene*: Santa Monica, California [Rustic Canyon] (Canu and Bassler, 1923). *Pliocene*: Red Crag of Walton-on-the-Naze, England (Kendall, 1931). *Recent*: World wide in warm waters of both Atlantic and Pacific oceans.

DEPTH: Shallow water. Intertidal to 108 fathoms reported in the literature.

Membranipora tenuis Desor, 1848.

- Membranipora tenuis* DESOR, 1848, Proc. Boston Soc. Nat. Hist., vol. 3, p. 66.
- Membranipora denticulata* BUSK, 1856, Quart. Jour. Micro. Sci., vol. 4, p. 176, pl. 7, figs. 1, 2.
- Hemiseptella grandicella* CANU and BASSLER, 1923, U. S. Nat. Mus. Bull. no. 125, p. 71, pl. 5, fig. 12.
- Membranipora tenuis*, OSBURN, 1950, Allan Hancock Pac. Expds., vol. 14, no. 1, pp. 26, 27, pl. 2, figs. 9, 10.

DESCRIPTION: Zoaria incrusting. Zooecia elongate, quadrangular, distinct, separated by a narrow groove in which may be a thin brown line. Mural rim distinctly tuberculated. Cryptocyst depressed, finely tuberculated. Free border of the cryptocyst bearing spinules that project into the oval opesia. The spinules straight, curved, or branched. Opesia occupying most of the frontal area.

MEASUREMENTS: Opesia 368/195 μ . Zooecia 769/333 μ .

LOCALITIES: LACMIP loc. 86-b, Newport Harbor mesa, Newport, California, Pleistocene. West Second and Pacific Avenue, San Pedro, California, Pleistocene.

OCCURRENCE: *Lower Miocene*: Bowden Marl, Bowden Jamaica (Canu and Bassler, 1923). *Recent: Pacific*: southern California, Mexico, Costa Rica (Hancock collections). *Atlantic*: Denmark (Levensen, 1894); Massachusetts (Desor, 1848, Osburn, 1912); North Carolina (Canu and Bassler, 1928); Florida (Smitt, 1873); Puerto Rico (Osburn, 1940); Brazil (Marcus, 1937); Tunis (Canu and Bassler, 1930); Netherlands (Lacourt, 1949).

DEPTH: Shore (intertidal) to 36 fathoms. Based on 17 records.

REMARKS: Not previously known as fossil from the Pacific coast.

Membranipora savarti (Audouin), 1826.

Flustra savarti AUDOIN, 1826, in Savigny, J. C., *Descrip. l'Egypte, Hist. Nat.*, vol. 1, pt. 4, p. 240, pl. 10, figs. 11a, b.

Acanthodesia savartii, CANU and BASSLER, 1920, U. S. Nat. Mus. Bull. no. 106, p. 100, pl. 21, figs. 2-4.

Acanthodesia savartii, CANU and BASSLER, 1923, U. S. Nat. Mus. Bull. no. 125, pp. 30, 31, pl. 11, figs. 1-9, pl. 2, figs. 2, 3, pl. 5, figs. 1-5, pl. 46, figs. 8, 9.

Acanthodesia savartii, CANU and BASSLER, 1930, *Proc. U. S. Nat. Mus.*, no. 2810, vol. 76, art. 13, p. 4.

Membranipora savarti, OSBURN, 1950, *Allan Hancock Pac. Expds.*, vol. 14, no. 1, pp. 27, 28, pl. 2, fig. 7.

DESCRIPTION: Zoaria incrusting. Zooecia moderately large, with short denticle projecting into the opening from the center of the basal region. Ooecia and avicularia wanting.

MEASUREMENTS: Oposia, 380/173 $m\mu$. Zooecia 518/300 $m\mu$.

LOCALITIES: LACMIP loc. 66-2. Newport Harbor mesa, Newport, California, Pleistocene.

OCCURRENCE: *Pleistocene*: Florida (Canu and Bassler, 1923). *Pliocene*: Red Crag of Walton-on-the-Naze, London, England (Kendall, 1931). *Miocene*: Australia (Canu and Bassler, 1920); Virginia (Canu and Bassler, 1923); Torino, Italy (Scotti, 1936); New Jersey (Richards, 1942). *Recent*: Florida, Tortugas Island, Gulf of Mexico, Puerto Rico (Osburn, 1940); Venezuela (Osburn, 1947); Sulu Sea, Celebes Sea, Zamboanga, P. I., Indian Ocean, Zanzibar, Red Sea, Ceylon, Galapagos (Canu and Bassler, 1929); Brazil (Marcus, 1937); Philippine Islands (Harmer, 1926); Suez Canal (Hastings, 1927); Great Barrier Reef, Australia (Livingston, 1927); Japan, Java, New Guinea, Singapore, Malay Peninsula (Okada and Mata-

wari, 1938); San Diego, California, Panama, Baja California, Costa Rica, Galapagos, Colombia, Mexico (Hancock stations).

DEPTH: 5 to 75 fathoms (shallow water characteristically).

REMARKS: Not previously known as fossil on the Pacific coast.

Genus **Conopeum** Gray, 1848

Conopeum commensale Kirkpatrick and Metzelaar, 1922.

Conopeum commensale KIRKPATRICK and METZELAAR, 1922, Proc. Zool. Soc. London, p. 985, pl. 1, figs 1, 4-7, 9.

Conopeum commensale, OSBURN, 1950, Allan Hancock Pac. Expds., vol. 14, no. 1, pp. 30, 31, pl. 2, figs. 12-15.

DESCRIPTION: Zoaria incrusting, multilaminar. Zooecia distinct, oval, alternate. Zooecial margins, in protected portions of a zoarium, granular, serrated along the opesia border. Proximal to each zooecium are two low tubercules, often fused so as to appear as a single prominence. No avicularia or ovicells.

MEASUREMENTS: Opesia, 403/208 μ . Zooecia, 530/299 μ .

LOCALITIES: LACMIP loc. 66-2, Newport Harbor mesa, Newport, California, Pleistocene. LACMIP loc. 136, Newport Bay Road, Newport, California, Pleistocene.

OCCURRENCE: *Recent: Atlantic:* Brazil (Marcus, 1937, 1938, 1939); Argentina (Kirkpatrick and Metzelaar, 1922). *Pacific:* Baja California, Mexico, Guatemala, Costa Rica, Panama, Ecuador, Peru (Hancock stations).

DEPTH: Shore collecting (intertidal) to 130 fathoms (21 records).

REMARKS: Not previously listed as fossil.

Genus **Antropora** Norman, 1903

Antropora tinctoria (Hastings), 1930.

Crassimarginatella tinctoria HASTINGS, 1930, Proc. Zool. Soc. London, 1929, pp. 708, 709, pl. 5, figs. 16a, p. 117, fig. 120. "*Membranipora ? denticulata* (old)" B.M. 99.7 1.1048 Busk (*vide* Hastings).

Membranipora lacroixi ROBERTSON, 1908, *partim*, Univ. Calif. Publ. Zool. vol. 4, no. 5, pp. 261, 262, pl. 14, fig. 5.

Antropora tinctoria, OSBURN, 1950, Allan Hancock Pac. Expds., vol. 14, no. 1, p. 54, pl. 4, fig. 7, p. 129, figs. 7, 8.

DESCRIPTION: Zoaria incrusting. Zooecia with a narrow tuberculate cryptocyst. Around each of the zooecia are 5 to 6 small triangular openings. Our fossil specimens give evidence of a few avicularia scattered among the zooecia.

MEASUREMENTS: Opesia, 242/162 μ . Zooecia, 368/230 μ .

LOCALITIES: LACMIP loc. 66-2, Newport Harbor mesa, Newport, California, Pleistocene.

OCCURRENCE: *Recent*: Panama Canal, Galapagos Islands (Hastings, 1930); Mazatlan, Mexico (Busk 1856, *vide* Hastings); California, Gulf of California, Baja California, Mexico, Guatemala, Costa Rica, Panama, Ecuador, Peru, Galapagos Islands (Hancock stations).

DEPTH: Shore (intertidal) to 103 fathoms (51 records).

REMARKS: Not previously found as fossil.

Genus *Cauloramphus* Norman, 1903

Cauloramphus spiniferum (Johnston), 1838.

Flustra spinifera JOHNSTON, 1838, Trans. Nat. Hist. Soc. Northumb. Durk. Newele., vol. 2, p. 266, pl. 9, fig. 6.

Membranipora spinifera, ROBERTSON, 1900, Proc. Wash. Acad. Sci., vol. 2, p. 324.

Membranipora spinifera, ROBERTSON, 1908, Univ. Calif. Pub. Zool., vol. 4, no. 5, p. 265, pl. 15, fig. 15.

Schizoporella spinifera, CANU and BASSLER, 1920, U. S. Nat. Mus. Bull. 106, pp. 337, 338.

Cauloramphus porosus CANU and BASSLER, 1923, U. S. Nat. Mus. Bull. 125, p. 48, pl. 35, fig. 17.

Membranipora spinifera, O'DONOGHUE and O'DONOGHUE, 1923, Contr. Canad. Biol., n. s., vol. 1, no. 10, p. 168.

Cauloramphus spinifer, O'DONOGHUE and O'DONOGHUE, 1925, Univ. Wash. Pub. Puget Sud. Biol. Sta. Trans., vol. 5, pp. 97, 98.

Cauloramphus spinifer, O'DONOGHUE and O'DONOGHUE, 1926, Contr. Canad. Biol., n. s., vol. 3, no. 3, p. 85.

Cauloramphus spiniferum, HASTINGS, 1930, Proc. Zool. Soc. London, 1929, p. 713.

Cauloramphus spiniferum, OSBURN, 1950, Allan Hancock Pac. Expds., vol. 14, no. 1, pp. 55, 56, pl. 5, fig. 9.

DESCRIPTION: Zoaria incrusting. Zooecia oval, alternate, margin wide, raised and roughened by minute tubercles. Zooecia having a variable number of spines in the recent Pacific material, 10-12, that have been eroded in the fossil material. This left shallow sockets which are considered to be "pores" by Canu and Bassler (1923). Recent species showing avicu-

larial tapering to small bases adjacent to the larger spines; thus the "pores" seen on the fossil specimens are not just the bases of avicularia, but also of spines. Aperture occupying entire frontal area.

MEASUREMENTS: *Opesia*, 621/264 $m\mu$. *Zooecia* 747/368 $m\mu$.

LOCALITIES: LACMIP loc. 130-7, opposite Berth 79, Los Angeles harbor, Timm's Point formation, Pleistocene. LACMIP loc. 66-2, Newport Harbor mesa, Newport, California, Pleistocene. Bath-house Beach, Santa Barbara, California, Pleistocene. W. Second and Pacific Avenue, San Pedro, California, Pleistocene.

OCCURRENCE: *Pleistocene*: Santa Barbara, California (Canu and Bassler, 1923). *Recent*: *Pacific*: Alaska (Robertson, 1902); British Columbia (O'Donoghue and O'Donoghue, 1923, 1925, 1926); California, Mexico, Peru, Galapagos Islands (Hancock Foundation station records); Galapagos Islands (Hastings, 1930). *Atlantic*: Arctic, Greenland, Sweden (Borg, 1930, 1933); E. Finmark (Norman, 1903); England (Johnston, 1838, 1847; Alder, 1857; Hincks, 1862, 1880; Bassindale, 1941, 1943; Mar. Biol. Assoc., 1931).

DEPTH: Shore (intertidal) to 230 fathoms, based on 35 records.

Family ALDERINIDAE Canu and Bassler, 1927

Genus *Callopora* Gray, 1848

Callopora circumclathrata (Hincks), 1881.

Membranipora circumclathrata HINCKS, 1881, Ann. Mag. Nat. Hist., ser. 5, vol. 8, p. 131, pl. 5, fig. 1.

Membranipora circumclathrata, ROBERTSON, 1908, Univ. Calif. Pub. Zool., vol. 4, no. 5, pp. 259, 260, pl. 14, figs. 1, 2.

Membranipora circumclathrata, O'DONOGHUE and O'DONOGHUE, 1923, Contr. Canad. Biol., n. s., vol. 1, p. 166.

Callopora circumclathrata, CANU and BASSLER, 1923, U. S. Nat. Mus. Bull. 125, p. 43, pl. 34, figs. 1-3.

Callopora circumclathrata, O'DONOGHUE and O'DONOGHUE, 1925, Univ. Wash. Pub. Puget Snd. Biol. Sta., Trans., vol. 5, p. 97.

Callopora circumclathrata, O'DONOGHUE and O'DONOGHUE, 1926, Contr. Canad. Biol. Fish., n. s., vol. 3, no. 3, p. 97.

Callopora circumclathrata, OSBURN, 1950, Allan Hancock Pac. Expds., vol. 14, no. 1, pp. 65, 66, pl. 7, fig. 1.

DESCRIPTION: Zoaria inerusting, due to erosion, lacking the spines prominent on the recent material. Zooecia elongate, oval, distinct. Mural rim of well preserved zooecia finely beaded, granular. Attachment points

of spines, both lateral and distal, indicated by small pits. Proximal avicularia abundant, variable in size. Few ovicells intact, smooth, raised, rounded.

MEASUREMENTS: Opesia 276/185 $m\mu$. Zooecia 518/299 $m\mu$.

LOCALITIES: LACMIP loc. 66-2, Newport Harbor mesa, Newport, California, Pleistocene.

OCCURRENCE: *Pleistocene*: Santa Monica, California (Cann and Bassler, 1923). *Recent: Pacific*: British Columbia, Puget Sound region (O'Donoghue 1923, 1925, 1926); California (Robertson, 1908, Hancock station records); Galapagos Islands (Hancock stations).

DEPTH: Shore (intertidal) to 131 fathoms (based on 11 records).

Callopora corniculifera (Hincks), 1882.

Membranipora corniculifera HINCKS, 1882, Ann. Mag. Nat. Hist., ser. 5, vol. 10, p. 468, pl. 20, figs. 4, 4a.

Hincksina (Membranipora) corniculifera, CANU and BASSLER, 1920, U. S. Nat. Mus. Bull. 106, p. 112.

Cauloramphus triangularis CANU and BASSLER, 1923, U. S. Nat. Mus. Bull. 125, pp. 48, 49, pl. 33, figs. 14-16.

Callopora corniculifera OSBURN, 1950, Allan Hancock Pac. Expds., vol. 14, no. 1, p. 66, 67, pl. 7, fig. 1.

DESCRIPTION: Zoaria incrusting. Zooecia distinct, large opesia ovoid, with narrow distal end. Scars of 6-8 spines on the opesial rim. Avicularia small, located on the mural rim of the distal half of the zooecia. Ovicells large, globose, some with a varied process immediately above the aperture.

MEASUREMENTS: Zooecia 640/410 $m\mu$.

LOCALITIES: LACMIP loc. 130-7, opposite Berth 79, Los Angeles harbor, Timm's Point formation, Pleistocene.

OCCURRENCE: *Pleistocene*: Santa Barbara, California (Cann and Bassler, 1923). *Recent*: British Columbia (Hincks, 1882); California (Osburn, 1950).

DEPTH: Two records (Hancock) 6 and 38 fathoms respectively. Hincks gave no depth data on the British Columbia specimens.

Genus **Copidozoum** Harmer, 1926

Copidozoum tenuirostre (Hincks), 1880.

Membranipora tenuirostris HINCKS, 1880, Ann. Mag. Nat. Hist., ser. 5, vol. 6, pp. 70, 71, pl. 9, fig. 3.

- Membranipora tenuirostris*, HINCKS, 1884, Ann. Mag. Nat. Hist., ser. 5, vol. 10, p. 465.
- Callopora tenuirostris*, CANU and BASSLER, 1920, U. S. Nat. Mus. Bull. 106, p. 146, figs. F, G, pp. 147, 154, pl. 29, figs. 10, 11.
- Callopora tenuirostris*, O'DONOGHUE and O'DONOGHUE, 1926, Contr. Canad. Biol. Fish., vol. 3, no. 3, p. 79, pl. 3, fig. 24.
- Callopora tenuirostris*, CANU and BASSLER, 1930, Proc. U. S. Nat. Mus., no. 2810, vol. 76, art. 13, pp. 2, 3, 8, 9.
- Copidozoum tenuirostre*, OSBURN, 1950, Allan Hancock Pac. Expds., vol. 14, no. 1, p. 72, pl. 7, fig. 4.

DESCRIPTION: Zoaria encrusting. Zooecia oval, broader below than above, with wide border. Few small spines (spinules) projecting into orifice from the rim. Avicularia found in interzooecial spaces, irregularly spaced throughout the zoarium.

MEASUREMENTS: Opesia 345/218 $m\mu$. Zooecia 437/276 $m\mu$.

LOCALITIES: Bath-house Beach, Santa Barbara, California, Pleistocene.

OCCURRENCE: *Miocene*: Touraine (Canu, *vide* Canu and Bassler, 1920). *Eocene*: Mississippi (Canu and Bassler, 1920). *Recent*: *Pacific*: British Columbia, Queen Charlotte Islands (Hincks, 1884, O'Donoghue, 1926); Galapagos Islands (Canu and Bassler, 1930); California, Gulf of California, Channel Islands, Baja California, Mexico, Costa Rica, Panama, Colombia (Hancock stations, Osburn, 1950); Galapagos Islands (Hancock stations). *Atlantic*: Brazil (Marcus, 1937); Florida (Canu and Bassler, 1928); Gulf of Mexico (Canu and Bassler, 1928); Cape Verde Islands (Waters, 1918); Mediterranean (Waters, 1879, 1885); Madeira (Hincks, 1880).

DEPTH: Shore (intertidal) to 164 fathoms (37 records).

REMARKS: Not previously recorded as fossil on the Pacific coast of North America.

Genus **Tegella** Levinsen, 1909

Tegella robertsonae (O'Donoghue and O'Donoghue), 1926.

- Membranipora unicornis*, ROBERTSON, 1900, Proc. Wash. Acad. Sci., vol. 2, p. 324.
- Membranipora occultata* ROBERTSON, 1908, Univ. Calif. Pub. Zool., vol. 4, no. 5, pp. 262, 263, pl. 14, figs. 6-9. (*non*) *Membranipora occultata* WATERS, 1887, Quart. Jour. Geol. Soc. London, vol. 43, p. 48, pl. 6, figs 12, 12a, pl. 8, fig. 40.
- Tegella* (*Membranipora*) *occultata*, CANU and BASSLER, 1920, U. S. Nat. Mus. Bull. 106, p. 166.
- Membranipora occultata*, O'DONOGHUE and O'DONOGHUE, 1923, Contr. Canad. Biol., n. s., vol. 1, no. 10, p. 167.
- Tegella robertsoni* O'DONOGHUE and O'DONOGHUE, 1926, Contr. Canad. Biol. Fish., n. s., vol. 3, no. 3, p. 82.

Tegella robertsonae, OSBURN, 1950, Allan Hancock Pac. Expds., vol. 14, no. 1, pp. 81, 82, pl. 9, fig. 5.

DESCRIPTION: Zoaria incrusting. Zooecia alternate, with large apertures occupying most of the frontal area. Inner rim of the margin finely notched. Avicularia large, frequent, raised, pointed obliquely forward. Occasional smaller broad avicularia may be found. Ovicells small, globose, may be surmounted by avicularia.

MEASUREMENTS: Aperture, 125/162 $m\mu$. Zooecia, 690/483 $m\mu$.

LOCALITIES: LACMIP loc. 76, "lumber yard" San Pedro, California, coll. Dr. A. T. Tieje. Pleistocene. Bath-house Beach, Santa Barbara, California, Pleistocene.

OCCURRENCE: *Pleistocene* (early): Japan, Dizodo Beds, Boso Peninsula (Sakakura, 1935). *Recent: Pacific*: Alaska (Robertson, 1900, 1908); British Columbia, (coll. E. F. Ricketts in Hancock collection); Vancouver Island (O'Donoghue and O'Donoghue, 1923, 1926).

DEPTH: 6 to 12 fathoms (one record).

REMARKS: Not previously recorded as fossil from the Pacific Coast of North America.

Genus *Chapperia* Willey, 1900

Chapperia patula (Hincks), 1881.

Membranipora patula HINCKS, 1881, Ann. Mag. Nat. Hist., ser. 5, vol. 7, p. 150, pl. 9, fig. 4.

Membranipora patula, HINCKS, 1882, Ann. Mag. Nat. Hist., ser. 5, vol. 10, p. 465.

Membranipora patula, ROBERTSON, 1908, Univ. Calif. Pub. Zool., vol. 4, no. 5, p. 263, pl. 15, fig. 10.

Membranipora patula, O'DONOGHUE and O'DONOGHUE, 1923, Contr. Canad. Biol., n. s., vol. 1, no. 10, p. 167.

Chaperia galeata CANU and BASSLER, 1923, U. S. Nat. Mus. Bull. 125, pp. 52-54, pl. 34, figs. 9, 10, but not 8.

Amphiblestrum patulum, O'DONOGHUE and O'DONOGHUE, 1925, Univ. Wash. Pub. Puget Snd. Biol. Sta. Trans., vol. 5, p. 97.

Amphlestrum patulum, O'DONOGHUE and O'DONOGHUE, 1926, Contr. Canad. Biol. Fish., n. s., vol. 3, no. 3, pp. 83, 84.

Chapperia patula, OSBURN, 1950, Allan Hancock Pac. Expds. vol. 14, no. 1, p. 89, pl. 10, figs. 1, 2.

DESCRIPTION: Zoaria incrusting. Zooecia distinct, large, broad, and short. Raised distal rim bearing the scars of 4-6 spines. Avicularia small, triangular, numerous, located in front of the spines on the border of the distal rim. Ovicells large, globular, smooth.

MEASUREMENTS: *Opesia*, 299/230 μ . *Zooecia* 690/356 μ .

LOCALITIES: Bath-house Beach, Santa Barbara, California, Pleistocene.

OCCURRENCE: *Pleistocene*: Santa Barbara, Santa Monica, California (Canu and Bassler, 1923) *Pliocene*: New Zealand (Waters, 1887); Italy (Manzoui, 1875). *Miocene*: Australia (Waters, 1882); Italy (Sequenza, 1882). *Recent*: *Pacific*: Queen Charlotte Islands (Hincks, 1882); California (Hincks, 1881, Robertson, 1908); Vancouver Island region (O'Donoghue and O'Donoghue, 1923, 1926); Puget Sound, Washington (O'Donoghue and O'Donoghue, 1925); California, Mexico, Baja California, Galapagos Islands (Hancock stations).

DEPTH: Shore (intertidal) to 252 fathoms (44 records).

DIVISION III, **COILOSTEGA** Levinsen, 1909

Family MICROPORIDAE Hincks, 1880

Genus **Microporina** Levinsen, 1909

Microporina borealis (Busk), 1855.

Salicornaria borealis BUSK, 1855, Quart. Jour. Micro. Sci., vol. 3, p. 254, pl. 1, figs. 1-3.

Cellaria borealis, HINCKS, 1882, Ann. Mag. Nat. Hist., ser. 5, vol. 10, p. 463.

Cellaria borealis, ROBERTSON, 1900, Proc. Wash. Acad. Sci., vol. 2, p. 322.

Cellaria borealis, ROBERTSON, 1905, Univ. Calif. Pub. Zool., vol. 2, no. 5, pp. 287, 288, pl. 16, fig. 102.

Cellaria borealis, O'DONOGHUE and O'DONOGHUE, 1923, Contr. Canad. Biol., n. s., vol. 1, no. 10, p. 165.

Microporina borealis, CANU and BASSLER, 1923, U. S. Nat. Mus. Bull. 125, p. 84.

Microporina (Salicornaria) borealis, O'DONOGHUE and O'DONOGHUE, 1926, Contr. Canad. Biol. Fish., n. s., vol. 3, no. 3, p. 95.

Microporina borealis, OSBURN, 1950, Allan Hancock Pac. Expds., vol. 14, no. 1, p. 106, pl. 11, fig. 2.

DESCRIPTION: Zoaria erect. Zooecia elongate, alternate, distinct with lateral walls raised. Aperture rounded distally with a pair of teeth projecting upward on the proximal rim. On some zooecia, avicularia occupying the area just distal to the aperture. No avicularian mandible preserved.

MEASUREMENTS: Aperture, 103/161 μ . Zooecia 690/264 μ .

LOCALITIES: LACMIP loc. 68-B, Newport Harbor mesa, lower north, Newport, California, Pleistocene. LACMIP loc. 130-7, opposite Berth 79, Los Angeles harbor, Timm's Point formation, Pleistocene.

OCCURRENCE: *Recent: Pacific:* Alaska (Robertson, 1900, 1905); Queen Charlotte Islands, British Columbia (Hincks, 1882); Vancouver Island region (O'Donoghue and O'Donoghue, 1923, 1926); Japan (Canu and Bassler, 1929, Sakakura, 1936, Silén, 1942); Alaska (Osburn, 1950). *Atlantic:* Greenland (Busk, 1855, Osburn, 1936); Spitzbergen (Nordgaard, 1917); Hudson Bay (Osburn, 1932).

Depth: 6 to 69 fathoms (5 records).

REMARKS: This appears to be the first occurrence of this species in the fossil record.

Genus **Labioporella** Harmer, 1926

Labioporella sinuosa Osburn, 1940.

Labioporella sinuosa OSBURN, 1940, N. Y. Acad. Sci., Sci. Sur. Porto Rico and Virgin Islands, vol. 16, pt. 3, p. 377, pl. 5, figs. 40, 41.

Labioporella sinuosa, OSBURN, 1950, Allan Hancock Pac. Expds., vol. 14, no. 1, pp. 109, 110, pl. 11, fig. 12.

DESCRIPTION: Zoaria incrusting. Zooecia regular, mural rim raised, beaded. Orifice large, arched anteriorly, almost straight across posteriorly. No avicularia. No ovicells.

MEASUREMENTS: Aperture, 92/172 μ . Zooecia 494/195 μ .

LOCALITIES: West Second and Pacific Avenue, San Pedro, California, Pleistocene.

OCCURRENCE: *Recent: Pacific:* Gulf of California, Baja California, Mexico, Panama, Ecuador (Osburn, 1950). *Atlantic:* Puerto Rico, Virgin Islands (Osburn, 1940).

DEPTH: Shore (intertidal) to 55 fathoms (4 records).

REMARKS: This species has not been previously recorded in the fossil record.

Family THALAMOPORELLIDAE Levinsen, 1909

Genus **Thalamoporella** Hincks, 1887

Thalamoporella californica (Levinsen), 1909.

(*Non*) *Membranipora gothica* BUSK, 1856, Quart. Jour. Micro. Sci., vol. 4, p. 176, pl. 7, figs. 5-7.

Steganoporella Rozieri form *gothica* HINCKS, 1880, Ann. Mag. Nat. Hist., ser. 5, vol. 6, p. 380, pl. 16, fig. 3.

Thalamoporella rozieri, ROBERTSON, 1908, Univ. Calif. Publ. Zool., vol. 4, no. 5, pp. 277-279, pl. 17, figs. 27-29, pl. 18, fig. 30.

Thalamoporella Rozieri var. *E. (californica)* LEVINSEN, 1909, Cheilo. Bryozoa, p. 184, pl. 66, figs. 2a-d, Copenhagen.

Thalamoporella californica, HASTINGS, 1930, Proc. Zool. Soc. Lond., 1929, no. 42, p. 716, pl. 10, figs. 47-53, pl. 11, figs. 56, 57.

Thalamoporella californica, OSBURN, 1950, Allan Hancock Pac. Expds., vol. 14, no. 1, pp. 111, 112, pl. 12, fig. 2.

DESCRIPTION: Zoaria large, incrusting or erect. Zooecia oblong, quadrangular, alternate. Margin broad, separating zooecial rows, and frequently rising anteriorly on each side of the orifice into blunt processes which may be continued in an arc around the oral extremity. Orifice prominent, occupying about one-third of the front. Scattered avicularia, large, some occupying the place of a zooecium in the colony. Ovicells, when present, large, smooth, globose, with a bilobate appearance.

MEASUREMENTS: Aperture, 118/69 μ . Zooecia 586/483 μ .

LOCALITIES: LACMIP loc. 66-2, Newport Harbor mesa, Newport, California, Pleistocene.

OCCURRENCE: *Recent: Pacific*: California (Robertson, 1908, Osburn, 1950); Galapagos Islands (Hastings, 1930, Osburn, 1950); Baja California, Mexico, Costa Rica, Panama (Osburn, 1950, and Hancock stations).

DEPTH: Shore (intertidal) to 80 fathoms.

REMARKS: This species is new to the fossil record.

Family LUNULARIIDAE Levinsen, 1909

Genus **Discoporella** d'Orbigny, 1852

Discoporella umbellata (Defrance), 1823.

Lunulites umbellata DEFANCE, 1823, Dict. Sci. Nat., vol. 27, p. 361.

Cupularia canariensis, ROBERTSON, 1908, Univ. Calif. Publ. Zool., vol. 4, no. 5, p. 314, pl. 24, figs. 90, 91.

Cupularia umbellata, CANU and BASSLER, 1923, U. S. Nat. Mus. Bull. 125, pp. 80-82, pl. 2, figs. 15-19.

Cupularia robertsoniae, CANU and BASSLER, 1923, U. S. Nat. Mus. Bull. 125, p. 82, pl. 34, figs. 5-7.

Discoporella umbellata, HASTINGS, 1930, Proc. Zool. Soc. Lond., 1929, no. 42, pp. 718, 719, pl. 11, fig. 54.

Cupularia umbellata, CANU and BASSLER, 1930, Proc. U. S. Nat. Mus., no. 2810, vol. 76, art. 13, pp. 11, 12.

Discoporella umbellata, OSBURN, 1950, Allan Hancock Pac. Expds., vol. 14, no. 1, pp. 113, 114, pl. 11, figs. 7-10

DESCRIPTION: Zoaria incrusting, flattened, wider than high, shaped like an umbrella or coolie-hat. Zooecia spirally arranged, elongate, distinct.

MEASUREMENTS: Oposia, 241/184 m μ . Zooecia, 368/240 m μ .

LOCALITIES: LACMIP loc. 66-2, Newport Harbor mesa, Newport, California, Pleistocene.

OCCURRENCE: *Pleistocene*: Santa Monica, California (Canu and Bassler, 1923). *Pliocene*: South Carolin, Florida (Canu and Bassler, 1923); Italy (Waters, 1921). *Miocene*: Florida, South Carolina, North Carolina, Costa Rica, Jamaica, Santo Domingo (Canu and Bassler, 1923); France, Austria, Hungary (Waters, 1921); Italy (Scotti, 1936); New Jersey, South Carolina (Gabb and Horn, 1862). *Oligocene*: France (Waters, 1921). *Recent*: *Pacific*: California, northern Channel Islands to Ecuador, Galapagos, Colombia, Panama, Costa Rica, Mexico, Gulf of California (Osburn, 1950); Galapagos (Canu and Bassler, 1930, Hastings, 1930); Colombia (Hastings, 1930); Guatemala, Baja California (Hancock stations). *Atlantic*: Florida, North Carolina (Smitt, 1873, Osburn, 1914); Panama, Tortuga, Aruba (Osburn, 1947); Gulf of Mexico (Canu and Bassler, 1928); Brazil (Silén, 1942); Canary Islands (Calvet, 1907); Spain (Norman, 1909).

DEPTH: Shore (intertidal) to 160 fathoms (187 records).

DIVISION IV, **PSEUDOSTEGA** Levinsen, 1909

Family CELLARIIDAE Hincks, 1880

Genus **Cellaria** Solander, 1786

Cellaria mandibulata Hincks, 1882.

Cellaria mandibulata HINCKS, 1882, Ann. Mag. Nat. Hist., ser. 5, vol. 10, pp. 463, 464.

Cellaria mandibulata, HINCKS, 1884, Ann. Mag. Nat. Hist., ser. 5, vol. 13, p. 209, pl. 9, fig. 7.

Cellaria mandibulata, ROBERTSON, 1905, Univ. Calif. Pub. Zool., vol. 4, no. 5, pp. 288, 289, pl. 15, figs. 87-89, pl. 16, fig. 103.

Cellaria mandibulata, CANU and BASSLER, 1923, U. S. Nat. Mus. Bull. 125, p. 86, pl. 34, figs. 11-14.

Cellaria mandibulata, O'DONOGHUE and O'DONOGHUE, Contr. Canad. Biol., n. s., vol. 1, no. 10, p. 165.

Cellaria mandibulata, OSBURN, 1950, Allan Hancock Pac. Expds., vol. 14, no. 1, pp. 116, 117, pl. 13, fig. 1.

DESCRIPTION: Zoaria of the fossil material only fragments of the masses of irregular branches such as are found in the specimens of this species living in present waters. Zooecia large, elongate, narrowed at the proximal end, situated within short slender internodes. Frontal raised, convex, minutely porous. Avicularia long, resembling most an extra large zooecium. Ooecia, when present, circular or oblong, occupying the space upon each zooecia above the orifice.

MEASUREMENTS: Aperture, 103/138 $m\mu$. Zooecia 598/276 $m\mu$.

LOCALITIES: LACMIP loc. 66-2, Newport Harbor mesa, south location, Newport, California, Pleistocene. Bath-house Beach, Santa Barbara, California, Pleistocene. Packard's Hill, Santa Barbara, California, Pleistocene. West Second and Pacific Avenue, San Pedro, California, Pleistocene.

OCCURRENCE: *Pleistocene*: Los Angeles, California (Canu and Bassler, 1923). *Recent*: *Pacific*: Queen Charlotte Islands (Hincks, 1882, 1884), Vancouver Island region (O'Donoghue and O'Donoghue, 1923); California (Robertson, 1905, Osburn, 1950); Mexico (Osburn, 1950); Channel Islands (Hancock stations). *Atlantic*: Aruba Island Caribbean Sea (Osburn, 1947).

DEPTH: Shore (intertidal) to 131 fathoms (75 records).

Cellaria diffusa Robertson, 1905.

Cellaria diffusa ROBERTSON, 1905, Univ. Calif. Pub. Zool., vol. 2, no. 5, pp. 289, 290, pl. 15, fig. 90, pl. 16, fig. 104.

Cellaria diffusa, CANU and BASSLER, 1923, U. S. Nat. Mus. Bull. 125, p. 86, pl. 34, figs. 19, 20.

Cellaria fissurifera CANU and BASSLER, 1923, U. S. Nat. Mus. Bull. 125, pp. 85, 86, pl. 34, figs. 15-18.

Cellaria diffusa, O'DONOGHUE and O'DONOGHUE, 1923, Contr. Canad. Biol., n. s., vol. 1, no. 10, p. 165.

Cellularia diffusa, O'DONOGHUE and O'DONOGHUE, 1925, Univ. Wash. Pub. Puget Snd. Biol. Sta., Trans., vol. 5, p. 100.

Cellularia diffusa, O'DONOGHUE and O'DONOGHUE, 1926, Contr. Canad. Biol. Fish., n. s., vol. 3, no. 3, p. 96.

Cellaria diffusa, OSBURN, 1950, Allan Hancock Pac. Expds., vol. 14, no. 1, pp. 117, 118, pl. 12, fig. 9.

DESCRIPTION: Zoaria consisting of fragments of elongate cylindrical internodes, connected by joints. Internode variable in length. Zooecia depressed, narrower below and above than in the middle, truncated at each end. Avicularia occurring in place of zooecia, small, almost square.

MEASUREMENTS: Aperture, 80/103 $m\mu$. Zooecia, 540/312 $m\mu$.

LOCALITIES: West Second and Pacific Avenue, San Pedro, California,

Pleistocene. LACMIP loc. 64, Hill-top quarry, Pleistocene. LACMIP loc. 130-7, opposite Berth 79, Los Angeles harbor, Timm's Point formation, Pleistocene.

OCURRENCE: *Pleistocene*: Santa Monica [Rustic Canyon], California (Canu and Bassler, 1923); Los Angeles, California (Canu and Bassler, 1923.) *Recent*: California, Channel Islands, Baja California, Galapagos, Mexico (Osburn, 1950, and Hancock station records); California (Robertson, 1905); Puget Sound (Robertson, 1905, O'Donoghue and O'Donoghue, 1925); Vancouver Island (O'Donoghue and O'Donoghue, 1923, 1926).

DEPTH: Shore (intertidal) to 118 fathoms (27 records).

DIVISION V, **CELLULARINA** Smitt, 1867

Family SCRUPOCELLARIIDAE Levinsen, 1909

Genus **Amastigia** Busk, 1852

Amastigia rudis (Busk), 1852.

Caberea rudis BUSK, 1852, Cat. Mar. Polyzoa, Brit. Mus., Cheilo. pt. 1, p. 38, pl. 46, figs. 1-3.

Amastigia rudis, OSBURN, 1950, Allan Hancock Pac. Expds., vol. 14, no. 1, p. 127, pl. 16, figs. 3-5.

DESCRIPTION: Zoaria erect, chitinous, multiserial. Zooecia crowded, ovoid. Avicularia of two types; frontal, small, triangular, dorsal, elongated, vibracula-like, pointing proximally. Marginal zooecia may have greatly enlarged frontal avicularia, gigantic, pointing proximally in contrast to the other smaller avicularia directed distally. Ovicells prominent, low, globose, with a heavily chitinized distal area well demarked from the proximal.

MEASUREMENTS: Zooecia range between 420 $m\mu$ and 490 $m\mu$.

LOCALITIES: West Second and Pacific Avenue, San Pedro, California, Pleistocene.

OCURRENCE: *Recent*: *Pacific*: Australia (Busk, 1852, MacGillivray, 1887, Haswell, 1880, Hineks, 1884); Netherlands East Indies (Harmer, 1926); Japan (Ortmann, 1889. Yanagi and Okada, 1918, Okada, 1934, Sakakura, 1935; Okada and Mawatari, 1935, Okada and Mawatari, 1938, Silén, 1941); California, Channel Islands, Mexico, Costa Rica (Osburn, 1950).

DEPTH: 2 to 49 fathoms (9 records).

REMARKS: This appears to be the first fossil record of this species.

Genus **Scrupocellaria** van Beneden, 1845**Scrupocellaria regularis** Osburn, 1940.

(*Non*) *Scrupocellaria cervicornis* BUSK, 1852, Cat. Mar. Polyzoa Brit. Mus., pt. 1, Cheilo., p. 24, pl. 52, figs. 1-4.

Cellularia cervicornis SMITT, 1872, K. Svensk. Vetensk. Akad. Handl., vol. 10, pt. 11, p. 14, pl. 5, figs. 39-42.

Scrupocellaria regularis OSBURN, 1940, N. Y. Acad. Sci., Sci. Sur. Porto Rico, Virgin Isl., vol. 16, pt. 3, pp. 384, 385.

Scrupocellaria regularis, OSBURN, 1950, Allan Hancock Pac. Expds., vol. 14, no. 1, p. 144, pl. 18, figs. 3, 4, pl. 20, fig. 3.

DESCRIPTION: Zoaria erect, non-incrusting. Zooecia short, ovoid. Many frontal avicularia, elevated, small, found on both sides of the aperture. Lateral avicularia less numerous, small. Vibracula chambers large, laterally placed. Fossil specimens lacking spines, vibracula and scuta. Ovicells, when present, globose, large, perforate.

MEASUREMENTS: Aperture, 230/190 μ . Zooecia, 340/175 μ .

LOCALITIES: Bath-house Beach, Santa Barbara, California, Pleistocene.

OCCURRENCE: *Recent: Pacific:* Gulf of California (Osburn, 1950). *Atlantic:* Florida (Smitt, 1872, Osburn, 1914); Bermuda (Verrill, 1900); Puerto Rico (Osburn, 1940); Colombia (Osburn, 1947); Aruba Island, Caribbean Sea (Osburn, 1947).

DEPTH: Shore (intertidal) to 45 fathoms (5 records).

REMARKS: This species has not been previously recorded in the fossil records.

Scrupocellaria varians Hincks, 1882.

Scrupocellaria varians HINCKS, 1882, Ann. Mag. Nat. Hist., ser. 5, vol. 10, pp. 461, 462, pl. 19, figs. 1-1e.

Scrupocellaria varians, ROBERTSON, 1905, Univ. Calif. Pub. Zool., vol. 2, no. 5, pp. 260, 261, pl. 8, figs. 38, 39, pl. 16, fig. 95.

Scrupocellaria varians, O'DONOGHUE and O'DONOGHUE, 1923, Contr. Canad. Biol., n. s., vol. 1, no. 10, p. 160.

Scrupocellaria varians, O'DONOGHUE and O'DONOGHUE, 1925, Pub. Puget Snd. Biol. Sta., vol. 5, p. 98.

Scrupocellaria varians, O'DONOGHUE and O'DONOGHUE, 1926, Contr. Canad. Biol. Fish., n. s., vol. 3, no. 3, p. 87.

Scrupocellaria varians, OSBURN, 1950, Allan Hancock Pac. Expds., vol. 14, no. 1, pp. 149, 150, pl. 19, fig. 5, pl. 20, fig. 6.

DESCRIPTION: Zoaria erect, non-incrusting. Zooecia elongated, narrowed. Frontal avicularia oblique, triangular, elevated. Vibracular chamber shortened, dorsally placed. Ovicell, when present, ovoid, imperforate.

MEASUREMENTS: Aperture 253/126 $m\mu$. Zooecia 470/190 $m\mu$.

LOCALITIES: West Second and Pacific Avenue, San Pedro, California, Pleistocene.

OCCURRENCE: *Recent: Pacific*: Queen Charlotte Islands (Hincks, 1884); Vancouver Island region (O'Donoghue and O'Donoghue, 1923, 1926); Puget Sound (O'Donoghue, 1925); California coast (Robertson, 1905, Osburn, 1950).

DEPTH: Intertidal to 138 fathoms.

REMARKS: Not previously found as a fossil.

DIVISION VI, **CRIBROMORPHA** Harmer, 1926

Family CRIBRILINIDAE Hincks, 1880

Genus **Reginella** Jullien, 1886

Reginella mucronata (Canu and Bassler), 1923.

Metracolpota mucronata CANU and BASSLER, 1923, U. S. Nat. Mus. Bull. 125, p. 92, pl. 35, fig. 4.

Reginella mucronata, OSBURN, 1950, Allan Hancock Pac. Expds., vol. 14, no. 1, pp. 180, 181, pl. 28, fig. 4, pl. 29, fig. 3.

DESCRIPTION: Zoaria incrusting. Zooecia distinct, elongate, convex, with 10 costules somewhat obscured by secondary calcification. Aperture wide, rounded above, and nearly straight on the proximal edge. On some zooecia the proximal rim of the aperture bears a central prominent blunt mucra, which appears bifid in the well preserved specimens. Ovicells globose, large, with a well defined keel along the mid-longitudinal line.

MEASUREMENTS: Aperture, 81/138 $m\mu$. Zooecia 552/356 $m\mu$.

LOCALITIES: Bath-house Beach, Santa Barbara, California, Pleistocene.

OCCURRENCE: *Pleistocene*: Santa Barbara, California (Canu and Bassler, 1923). *Recent*: California, Channel Islands, Baja California, Gulf of California, Mexico (Osburn, 1950).

DEPTH: 10 to 150 fathoms (17 records).

Genus *Colletosia* Jullien, 1886*Colletosia radiata* (Moll), 1803.

Eschara radiata MOLL, 1803, Seerinde, p. 63, pl. 4, fig. 7. (*fide* Hincks, Hist. Brit. Mar. Polyzoa, vol. 1, pp. 185-190, pl. 25, figs. 1-9).

Cribrilina radiata, HINCKS, 1883, Ann. Mag. Nat. Hist., ser. 5, vol. 11, pp. 442, 443.

Puellina radiata, CANU and BASSLER, 1920, U. S. Nat. Mus. Bull. 106, p. 294, fig. 84g-h, pp. 295, 296, pl. 41, figs. 14-18.

Puellina innominata CANU and BASSLER, 1923, U. S. Nat. Mus. Bull. 125, pp. 90, 91, pl. 15, fig. 13.

Puellina radiata forma *scripta* CANU and BASSLER, 1923, U. S. Nat. Mus. Bull. 125, pp. 89, 90, pl. 15, fig. 12, pl. 35, fig. 1.

Puellina radiata forma *rarecosta* CANU and BASSLER, 1923, U. S. Nat. Mus. Bull. 125, p. 90.

Cribrilina radiata var. *radiata* O'DONOGHUE and O'DONOGHUE, 1923, Contr. Canad. Biol., n. s., vol. 1, no. 1, p. 172.

Puellina radiata, O'DONOGHUE and O'DONOGHUE, 1923, Univ. Wash. Pub. Puget Snd. Biol. Sta. Trans., vol. 5, p. 101.

Puellina radiata var. *radiata*, O'DONOGHUE and O'DONOGHUE, 1926, Contr. Canad. Biol. Fish., n. s., vol. 3, no. 3, p. 97.

Puellina radiata, CANU and BASSLER, 1930, Proc. U. S. Nat. Mus., no. 2810, vol. 76, art. 13, pp. 3, 13.

Puellina innominata, CANU and BASSLER, 1930, Proc. U. S. Nat. Mus., no. 2810, vol. 76, art. 13, pp. 3, 13.

Colletosia radiata, OSBURN, 1950, Allan Hancock Pac. Expds., vol. 14, no. 1, pp. 187, 188, pl. 29, figs. 2, 2a.

DESCRIPTION: Zoaria inerusting. Zooecia distinct, frontal costate, convex, in our fossil material heavily coated with secondary calcification. Some of the zooecia showing one or two small round pores just proximal to the aperture on the midline. Aperture rounded distally, with a straight proximal border. Distal rim bearing the scars of five spines. Vicarious avicularia rare. Ovicell large, globose.

MEASUREMENTS: Aperture, 46/69 μ . Zooecia, 357/219 μ .

LOCALITIES: LACMIP loc. 66-2, Newport Harbor mesa, south location, Newport, California, Pleistocene. Bath-house Beach, Santa Barbara, California, Pleistocene.

OCCURRENCE: *Pleistocene*: Santa Barbara, California (Canu and Bassler, 1923); Santa Monica, California (Canu and Bassler, 1923); Dizodo Beds, Boso Peninsula, Japan (Sakakura, 1935). *Pliocene*: Italy (Neviani, 1905); Panama (Canu and Bassler, 1928); France (Canu, 1925). *Miocene*: Austria, Hungary (Canu, 1924); Austria (Gillard, 1938); Florida (Canu and Bassler, 1923); North Carolina (Canu and Bassler, 1923); Virginia (Canu and Bassler, 1923). *Oligocene*: Leeward Island (Canu and Bassler,

1923); Alabama (Canu and Bassler, 1923); Alaska (Howe, 1942); Africa (Roger, 1943). *Eocene*: Belgium (Canu, 1910); North Carolina, South Carolina, Georgia, Florida (Canu and Bassler, 1920); South Carolina, Alabama (Canu and Bassler, 1923). *Recent: Pacific*: Queen Charlotte Islands (Hincks, 1883); Vancouver Island region (O'Donoghue and O'Donoghue, 1923, 1926); Puget Sound (O'Donoghue and O'Donoghue, 1925); Hawaii (Canu and Bassler, 1927); South China Sea, Japan (Silén, 1942); Galapagos Islands (Canu and Bassler, 1930, Osburn, 1950); Oregon, south to Peru (Osburn, 1950); California, Mexico, Baja California, Gulf of California, Panama, Colombia (Hancock stations); Australia (Livingstone, 1927). *Atlantic*: Madeira (Hincks, 1883, Busk, 1858, Norman, 1909); Britain (Hincks, 1880); Tunis (Canu and Bassler, 1930); Naples, Italy (Waters, 1885, Harmer, 1902); Azores, Cape Verde Islands, Canary Islands (Waters, 1918, Calvet, 1931); France (Calvet, 1907); Spain (Barroso, 1921); Florida, Georgia, Cuba, Gulf of Mexico, Puerto Rico (Osburn, 1940, Canu and Bassler, 1928, Smitt, 1873); Tortuga and Aruba islands (Osburn, 1947); Brazil (Marcus, 1937, Kirkpatrick, 1888).

DEPTH: Shore (intertidal) to 268 fathoms (92 records).

ASCOPHORA Levinsen, 1909

Family HIPPOTHOIDAE Levinsen, 1909

Genus **Hippothoa** Lamouroux, 1821

Hippothoa hyalina (Linné), 1767.

Cellepora hyalina LINNÉ, 1767, Systema Naturae, ed. 12, vol. 1, pt. 2, p. 1286.

Schizoporella hyalina, HINCKS, 1883, Ann. Mag. Nat. Hist., ser. 5, vol. 11, p. 445.

Schizoporella hyalina, ROBERTSON, 1900, Proc. Wash. Acad. Sci., vol. 2, p. 326.

Schizoporella hyalina, ROBERTSON, 1908, Univ. Calif. Publ. Zool., vol. 4, no. 5, pp. 289-290, pl. 19, figs. 43-45.

Hippothoa hyalina, CANU and BASSLER, 1920, U. S. Nat. Mus. Bull. 106, p. 326, figs. 93a-i.

Hippothoa hyalina, CANU and BASSLER, 1923, U. S. Nat. Mus. Bull. 125, pp. 92-94, pl. 35, fig. 4.

Hippothoa hyalina var. *rugosa* CANU and BASSLER, 1923, U. S. Nat. Mus. Bull. 125, pp. 94, pl. 35, fig. 9.

Schizoporella hyalina, O'DONOGHUE and O'DONOGHUE, 1923, Contr. Canad. Biol., n. s., vol. 1, no. 10, pp. 177, 178.

Hippothoa hyalina, O'DONOGHUE and O'DONOGHUE, 1925, Univ. Wash., Pub. Puget Snd. Biol. Sta. Trans., vol. 5, p. 101.

Hippothoa hyalina, O'DONOGHUE and O'DONOGHUE, 1926, Contr. Canad. Biol. Fish., n. s., vol. 3, p. 100.

Hippothoa hyalina, HASTINGS, 1930, Proc. Zool. Soc. Lond., 1929, p. 720.

Hippothoa hyalina, OSBURN, 1952, Allan Hancock Pac. Expds., vol. 14, no. 2, p. 277, pl. 30, figs. 1-5.

DESCRIPTION: Zoaria forming either single layered incrustations, or multilaminar formations. Zooecia either subcylindrical, elongate distinct, disposed in radiating rows separated by large pores, or stubby, barrel-shaped, thick-walled, wrinkled. Orifice well rounded, wide, with a broad shallow sinus, with or without a pair of small denticles. Ovicells large, globose, with or without pores.

MEASUREMENTS: Aperture, 67/70 m μ . Zooecia, 330/207 m μ .

LOCALITIES: Bath-house Beach, Santa Barbara, California, Pleistocene.

OCCURRENCE: *Pleistocene*: Santa Barbara, California, Dead Man's Island, San Pedro, California, Los Angeles, California, Santa Monica, California (Canu and Bassler, 1923). *Pliocene*: England (Busk, 1859, Hincks, 1880). *Recent*: *Pacific*: Queen Charlotte Islands (Hincks, 1883); Alaska (Robertson, 1900); California (Robertson, 1908, Canu and Bassler, 1923); Vancouver Island region (O'Donoghue and O'Donoghue, 1923, 1926); Puget Sound (O'Donoghue and O'Donoghue, 1925); Japan (Okada, 1929); Galapagos (Hastings, 1930); California Channel Islands, Baja California, Mexico, Peru, Ecuador, Galapagos Islands, Washington, British Columbia (Hancock stations). *Atlantic*: British Isles (Hassall, 1841, Johnston, 1847, Hincks, 1862, 1880, Mar. Biol. Ass'n, 1931); Norway, Sweden (Norman, 1894, Nordgaard, 1906, 1918, 1927, Broch, 1928, Borg, 1933); Adriatic (Heller, 1867); Iceland, Greenland, Labrador (Packard, 1863, Verrill and Smith, 1873, Hincks, 1877, Osburn, 1912, 1919, 1936, Borg, 1933); Hudson Bay (Osburn, 1923, 1932, Borg, 1933); Chesapeake Bay, Mt. Desert Region, Maine, Long Island Sound, Woods Hole, Massachusetts (Osburn, 1912, 1932, 1944, Hutchins, 1945, Rogick, 1945, Verrill and Smith, 1873); Netherlands (Lacourt, 1949).

DEPTH: Shore (intertidal) to 100 fathoms (94 records).

Family PETRALIIDAE Levinsen, 1909

Genus **Hippopodina** Levinsen, 1909

Hippopodina feegeensis (Busk), 1884.

Lepralia feegensis BUSK, 1884, Rep. Voy. H.M.S. *Challenger*, vol. 10, pt. 3, Polyzoa, pp. 144, 145, pl. 22, fig. 9.

Hippopodina feegeensis, CANU and BASSLER, 1920, U. S. Nat. Mus. Bull. 106, p. 532, figs. 156a-j.

Hippopodina feegeensis, CANU and BASSLER, 1923, U. S. Nat. Mus. Bull. 125, p. 163, fig. 29a.

Hippopodina feegeensis, HASTINGS, 1930, Proc. Zool. Soc. Lond., 1929, p. 729.

Hippopodina feegeensis, OSBURN, 1952, Allan Hancock Pac. Expds., vol. 14, no. 2, pp. 292, 293, pl. 31, figs. 6-8.

DESCRIPTION: Zoaria incrusting. Zooecia distinct, alternate, large with a porous frontal. Aperture large, arched above and below, but slightly narrower below with a pair of lateral cardelles. Peristome low, well defined. Our specimens, although well preserved, lacking ovicells. Few avicularia present, placed along the aperture, pointing distally.

MEASUREMENTS: Zooecia 815/580 $m\mu$.

LOCALITIES: LACMIP loc. 66-2, Newport Harbor mesa, Newport, California, Pleistocene.

OCCURRENCE: *Recent: Pacific*: Ceylon (Thornely, 1905); Colombia (Hastings, 1930); Philippines, Hong Kong (Busk, 1884); Singapore (Levinsen, 1909); Australia (MacGillivray, 1891). No Hancock stations. *Atlantic*: Curaçao (Osburn, 1927); West Indies (Levinsen, 1909); specimens collected in Florida by R. C. Osburn.

DEPTH: Unknown.

REMARKS: This species has not been recovered previously as a fossil.

Family SCHIZOPORELLIDAE Bassler, 1935

Genus **Arthropoma** Levinsen, 1909

Arthropoma cecili (Audouin), 1826.

Flustra cecili AUDOUIN, 1826, in Savigny, J. C., Descr. de l'Egypte Hist. Nat., vol. 1, pt. 4, p. 8, fig. 3.

Schizoporella Cecillii, HINCKS, 1883, Ann. Mag. Nat. Hist., ser. 5, vol. 11, p. 445.

Schizoporella cecili, ROBERTSON, 1908, Univ. Calif. Pub. Zool., vol. 4, no. 5, p. 288, pl. 19, fig. 42.

Arthropoma cecillii, CANU and BASSLER, 1920, U. S. Nat. Mus. Bull. 106, p. 351, fig. 105a-d.

Arthropoma cornuta CANU and BASSLER, 1923, U. S. Nat. Mus. Bull. 125, p. 97, pl. 16, fig. 3.

Schizoporella cecillii, O'DONOGHUE and O'DONOGHUE, 1923, Contr. Canad. Biol., n. s., vol. 1, no. 10, p. 177.

Arthropoma cecillii, O'DONOGHUE and O'DONOGHUE, 1926, Contr. Canad. Biol. Fish., n. s., vol. 3, no. 3, p. 104.

Arthropoma cecili, CANU and BASSLER, 1930, Proc. U. S. Nat. Mus., no. 2810, vol. 76, art. 13, p. 16.

Arthropoma cecili, OSBURN, 1952, Allan Hancock Pac. Expds., vol. 14, no. 2, pp. 333, 334, pl. 38, figs. 1-3.

DESCRIPTION: Zoarium incrusting. Zooecia obscure because of secondary calcification, alternate punctate. Aperture rounded distally, with a straight proximal margin containing a distinct sinus. No ovicells on our specimen.

MEASUREMENTS: Aperture, 80/69 $m\mu$. Zooecia not possible to measure.

LOCALITIES: West Second and Pacific Avenue, San Pedro, California, Pleistocene.

OCCURRENCE: *Pleistocene*: Dizodo Beds, Japan (Sakakura, 1935). *Pliocene*: no records. *Miocene*: Florida (Canu and Bassler, 1923). *Recent*: *Pacific*: Japan (Ortmann, 1890, Sakakura, 1935, Okada and Mawatari, 1935); Queen Charlotte Islands (Hineks, 1883); Vancouver Island region (O'Donoghue and O'Donoghue, 1923, 1926); Galapagos Islands (Canu and Bassler, 1930); California (Robertson, 1908, Canu and Bassler, 1930); Australia (Livingstone, 1927); Baja California, Mexico (Hancock stations.) *Atlantic*: England (Busk, 1857, Hineks, 1862, 1880); France (Calvet, 1902, 1907); Brazil, (Marcus, 1937); Africa (O'Donoghue, 1935).

DEPTH: 11 to 398 fathoms (12 records).

REMARKS: Not previously known as a fossil from the Pacific coast.

Genus **Schizoporella** Hineks, 1877

Schizoporella cornuta (Gabb and Horn), 1862.

Reptescharellina cornuta GABB and HORN, 1862, Jour. Acad. Nat. Sci., Phila., ser. 2, vol. 5, pt. 2, pp. 147, 148, pl. 20, fig. 31.

Schizoporella biaperta HINCKS, 1883, Ann. Mag. Nat. Hist., ser. 5, vol. 11, pp. 445, 446.

Schizoporella biaperta, HINCKS, 1884, Ann. Mag. Nat. Hist., ser. 5, vol. 13, pp. 57, 58.

Schizoporella biaperta, HINCKS, 1884, Ann. Mag. Nat. Hist., ser. 5, vol. 13, pp. 211, 212.

(?) *Schizoporella biaperta*, ROBERTSON, 1900, Proc. Wash. Acad. Sci., vol. 2, p. 326.

Schizoporella biaperta, ROBERTSON, 1908, (*partim*), Univ. Calif. Pub. Zool., vol. 4, no. 5, pp. 287, 288, pl. 19, fig. 41.

Stephanosella biaperta, CANU and BASSLER, 1923, (*partim*). U. S. Nat. Mus. Bull. 125, pp. 99-101, figs. 4-8.

(?) *Schizoporella biaperta* O'DONOGHUE and O'DONOGHUE, 1923, Contr. Canad. Biol., n. s., vol. 1, no. 10, p. 177.

(?) *Stephanosella biaperta*, O'DONOGHUE and O'DONOGHUE, 1925, Univ. Wash., Pub. Puget Snd. Biol. Sta., vol. 5, p. 102.

(?) *Stephanosella biaperta*, O'DONOGHUE and O'DONOGHUE, 1926, Contr. Canad. Biol. Fish., n. s., vol. 3, no. 3, p. 104.

(?) *Stephanosella biaperta*, HASTINGS, 1930, Proc. Zool. Soc. Lond., 1929, p. 721.

Schizopodrella (Stephanosella) biaperta, CANU and BASSLER, 1930, Proc. U. S. Nat. Mus., no. 2810, vol. 76, art. 13, pp. 16, 17, pl. 2, fig. 1, 2.

Schizoporella cornuta, OSBURN, 1952, Allan Hancock Pac. Expds., vol. 14, no. 2, pp. 320, 321, pl. 37, figs. 9-11.

DESCRIPTION: Zoaria incrusting. Zooecia ovate, slightly convex, frontal porous, though in the fossil specimens well obscured by secondary calcification. Orifice subcircular, proximal border almost straight and having distinct sinus. No oral spines. At each side of the orifice is situated an elevated avicularium. Ooecia globular, front wall flattened and traversed by radiating lines.

MEASUREMENTS: Aperture, 108/98 μ . Zooecia 465/345 μ .

Localities: Bath-house Beach, Santa Barbara, California, Pleistocene.

OCCURRENCE: *Pleistocene*: Santa Barbara, California (Gabb and Horn, 1862; Dizodo Beds, Japan (Sakakura, 1935); Los Angeles, Santa Monica, Dead Man's Island, San Pedro, California (Canu and Bassler, 1923). *Pliocene*: (?) New Zealand, Italy (Waters, 1887); (?) Sicily (Waters, 1878); (?) England (Hincks, 1880). *Recent*: Queen Charlotte Islands (Hincks, 1883, 1884); California (Robertson, 1908); Galapagos Islands (Canu and Bassler, 1930). Hancock stations in California, Channel Islands, Baja California, Mexico, Panama, Ecuador, Colombia, and Galapagos Islands are known Pacific areas. It is certain that checking on specimens of *S. biaperta* from the Atlantic will reveal that some have a perforate frontal and hence should be reclassified as *S. cornuta*.

Schizoporella linearis inarmata (Hincks), 1884

Schizoporella linearis, HASSALL, form *inarmata* HINCKS, 1884, Ann. Mag. Nat. Hist., ser. 5, vol. 13, p. 212.

Schizoporella linearis HASSALL, subsp. *inarmata*, ROBERTSON, 1908, Univ. Calif. Pub. Zool., vol. 4, no. 5, p. 291, pl. 20, fig. 48.

Schizoporella linearis HASSALL, var. *inarmata*, O'DONOGHUE and O'DONOGHUE, 1923, Contr. Canad. Biol., n. s., vol. 1, no. 10, p. 178.

Schizopodrella linearis (HASSALL) var. *inarmata*, O'DONOGHUE and O'DONOGHUE, 1925, Univ. Wash., Pub. Puget Snd. Biol. Sta., vol. 5, p. 102.

Schizopodrella linearis (HASSALL), 1841, var. *inarmata*, O'DONOGHUE and O'DONOGHUE, 1926, Contr. Canad. Biol. Fish., n. s., vol. 3, no. 3, p. 104.

Schizoporella linearis var. *inarmata*, OSBURN, 1952, Allan Hancock Pac. Expds., vol. 14, no. 2, pp. 319, 320, pl. 37, figs. 4, 5.

DESCRIPTION: Zoaria incrusting. Zooecia elongate, in a rough linear series, somewhat obscured by secondary calcification. Frontal porous, uneven. Aperture rounded above with a "V"-shaped sinus in the proximal rim. Avicularia wanting. No ovicells on the specimens.

MEASUREMENTS: Aperture, 78/92 $m\mu$. Zooecia 414/320 $m\mu$.

LOCALITIES: West Second and Pacific Avenue, San Pedro, California, Pleistocene.

OCCURRENCE: *Recent: Pacific*: Queen Charlotte Islands (Hincks, 1884); California (Robertson, 1908); Puget Sound, Washington (O'Donoghue and O'Donoghue, 1925); Vancouver Island, British Columbia region (O'Donoghue and O'Donoghue, 1923, 1926). Hancock stations, Mexico, Gulf of California, Baja California, Costa Rica.

DEPTH: 10 to 57 fathoms (8 records).

REMARKS: This appears to be the first appearance of the species in the fossil record.

Genus **Schizomavella** Canu and Bassler, 1917

Schizomavella auriculata cuspidata (Hincks), 1880.

Schizoporella auriculata var. *B. (cuspidata)* HINCKS, 1880, Hist. Brit. Mar. Polyzoa, vol. 1, pp. 261-263, pl. 29, fig. 8.

DESCRIPTION: Zoaria incrusting. Zooecia distinct, frontal concave, arranged in linear series. Aperture rounded above, proximal margin with a distinct sinus. Avicularia suboral, raised. Ovicells large globular, punctate, distally bearing a sharp prong-like process on the mid-line.

MEASUREMENTS: Aperture, 90/57 $m\mu$. Zooecia 435/218 $m\mu$.

LOCALITIES: Bath-house Beach, Santa Barbara, California, Pleistocene.

OCCURRENCE: *Recent*: Isle of Guernsey, Mediterranean (Hincks, 1880).

DEPTH: Unknown.

REMARKS: This variety, so far as we can determine, has not been previously reported as fossil.

Genus **Hippodiplosia** Canu, 1916

Hippodiplosia insculpta (Hincks), 1882.

Schizoporella insculpta HINCKS, 1882, Ann. Mag. Nat. Hist., ser. 5, vol. 10, pp. 251-252.

Schizoporella insculpta, HINCKS, 1883, Ann. Mag. Nat. Hist., ser. 5, vol. 11, p. 447, figs. 5, 5a.

Schizoporella insculpta, ROBERTSON, 1900, Proc. Wash. Acad. Sci., vol. 2, p. 326.

- Schizoporella insculpta*, ROBERTSON, 1908, Univ. Calif. Pub. Zool., vol. 4, no. 5, pp. 290, 291, pl. 20, figs. 46, 47.
- Schizoporella insculpta*, O'DONOGHUE and O'DONOGHUE, 1923, Contr. Canad. Biol., n. s., vol. 1, no. 10, pp. 178, 179.
- Schizoporella insculpta*, O'DONOGHUE and O'DONOGHUE, 1925, Univ. Wash. Pub. Puget Snd. Biol. Sta. Trans., vol. 5, p. 102.
- Schizoporella insculpta*, O'DONOGHUE and O'DONOGHUE, 1926, Contr. Canad. Biol. Fish., n. s., vol. 3, no. 3, p. 103.
- Hippodiplosia insculpta*, OSBURN, 1952, Allan Hancock Pac. Expds., vol. 14, no. 2, pp. 341, 342, pl. 40, figs. 1, 2.

DESCRIPTION: Zoaria incrusting. Zooecia large, alternate. Frontal wall with large pores. Aperture rounded above, lower margin occupied almost entirely by a wide shallow sinus. Ovicells large, abundant, sometimes covering two-thirds of the zooecia above, and occasionally punctured about the base. Ooecial walls covered by granular ridges radiating from the oral arch. Avicularia lacking.

MEASUREMENTS: Aperture, 69/103 $m\mu$. Zooecia 460/241 $m\mu$.

LOCALITIES: West Second and Pacific Avenue, San Pedro, California, Pleistocene.

OCCURRENCE: *Recent: Pacific:* Alaska (Robertson, 1900); Queen Charlotte Islands (Hincks, 1882, 1883); Vancouver Island region (O'Donoghue and O'Donoghue, 1923, 1926); Puget Sound (O'Donoghue, 1925); California (Robertson, 1908); Hancock stations, Oregon, California, Mexico, Gulf of California, Costa Rica.

DEPTH: Shore (intertidal) to 126 fathoms (19 records).

REMARKS: Not previously recorded as fossil.

Family HIPPOPORINIDAE Osburn, 1952

Genus **Hippoporella** Canu, 1917

Hippoporella gorgonensis Hastings, 1930.

Hippoporella gorgonensis HASTINGS, 1930, Proc. Zool. Soc. London, 1929, pp. 723, 724, pl. 12, figs. 62-72, pl. 17, figs. 119, 121.

Hippoporella gorgonensis, OSBURN, 1952, Allan Hancock Pac. Expds., vol. 14, no. 2, pp. 348, 349, pl. 45, figs. 10-12.

DESCRIPTION: Zoaria incrusting. Zooecia with frontal wall finely granular, with lateral areolar pores small. Ovicell nonporous, shallow roughened. Avicularia variable, may be found on both sides of the aperture, or on just one side, replacing lateral processes. There may be an avicularium on the frontal wall, directed away from the apertures.

MEASUREMENTS: Aperture, 115/149 $m\mu$. Zooecia 380/234 $m\mu$.

LOCALITIES: LACMIP loc. 66-2, Newport Harbor mesa, Newport, California, Pleistocene.

OCCURRENCE: *Recent: Pacific*: Panama, Colombia, Galapagos Islands (Hastings, 1930); Hancock stations, California, Mexico, Baja California, Panama, Costa Rica, Colombia, Ecuador, Galapagos. *Atlantic*: Brazil, St. Helena (Mareus, 1937, 1938).

DEPTH: Shore (intertidal) to 150 fathoms (20 records).

REMARKS: This species is new to the fossil list.

Genus **Hippoporidra** Canu and Bassler, 1927

Hippoporidra edax (Busk), 1859.

Cellepora edax BUSK, 1859, Monogr. Fossil Polyzoa Crag, London, p. 59, pl. 9, fig. 6, pl. 22, fig. 3.

Cellepora minuta CANU and BASSLER, 1923, U. S. Nat. Mus. Bull. 125, p. 182, pl. 25, figs. 10-13.

DESCRIPTION: Zoaria forming heavy incrustations. Zooecia irregularly placed, marginal area distinctly punctured. Aperture rounded anteriorly, somewhat contracted below the middle, forming a small distinct denticle on either side. Posterior edge arched proximally. A few small oral avicularia, situated close to the aperture, may be found. Ovicells, when present, rounded.

MEASUREMENTS: Aperture, 920/690 $m\mu$.

LOCALITIES: LACMIP loc. 66-2, Newport Harbor mesa, Newport, California, Pleistocene. LACMIP loc. 136, Newport Bay road, Newport, California, Pleistocene.

OCCURRENCE: *Pliocene*: South Carolina (Canu and Bassler, 1923, 1928); England (Busk, 1859, Kendall, 1931). *Miocene*: North Carolina (Canu and Bassler, 1923, 1928). *Oligocene*: Australia (Waters, 1882, 1885). *Recent: Atlantic*: North Sea (Prenant, 1931); England (Busk, 1861, Hineks, 1862, 1880); Yucatan, Gulf of Mexico (Canu and Bassler, 1928); Tortugas Islands (Osburn, 1914); Florida (Smitt, 1873); New Jersey (Osburn, 1940).

DEPTH: 15-79 fathoms, (4 records).

REMARKS: Not reported as living from the Pacific coast.

Genus **Stephanosella** Canu and Bassler, 1917**Stephanosella biaperta** (Michelin), 1842.

Eschara biaperta MICHELIN, 1842, Iconogr. zoophytol., p. 330, pl. 79, fig. 3.

(?) *Schizoporella biaperta*, ROBERTSON, 1900, Proc. Wash. Acad. Sci., vol. 2, p. 326.

Schizoporella biaperta, ROBERTSON, 1908, (*partim*), Univ. Calif. Pub. Zool., vol. 4, no. 5, pp. 287, 288, pl. 19, fig. 41.

Stephanosella biaperta, CANU and BASSLER, 1923, (*partim*), U. S. Nat. Mus. Bull. 125, pp. 99-101, fig. 9.

(?) *Stephanosella biaperta*, HASTINGS, 1930, Proc. Zool. Soc. London, 1929, p. 721.

Stephanosella biaperta, OSBURN, 1952, Allan Hancock Pac. Expds., vol. 14, no. 2, pp. 368, 369, pl. 42, figs. 1, 2.

DESCRIPTION: Zoaria incrusting, rough. Zoecia ovoid, somewhat raised, the frontal not perforate, thickened and some specimens obscured by secondary calcification. Recent specimens having 4 or 5 areolar pores to each side that are obliterated frequently in the fossil material, limiting positive identification to only the extremely well preserved specimens. Aperture rounded, widened, with a sinus in the proximal border. No ovicells found on our fossil material.

MEASUREMENTS: Aperture, 115/140 $m\mu$. Zoecia 640/375 $m\mu$.

LOCALITIES: West Second and Pacific Avenue, San Pedro, California, Pleistocene.

OCCURRENCE: *Pleistocene*: Los Angeles, Dead Man's Island San Pedro, Santa Monica, California (Canu and Bassler, 1923). *Recent*: California (Robertson, 1908); (?) Alaska (Robertson, 1900); Specimens in the Hancock collection from Alaska, collected by G. E. MacGinitie.

DEPTH: 20 to 40 fathoms.

Family MICROPORELLIDAE Hincks, 1880

Genus **Microporella** Hincks, 1877**Microporella ciliata** (Pallas), 1766.

Eschara ciliata PALLAS, 1766, Elenchus Zoophytorum, p. 38.

Microporella ciliata, HINCKS, 1883, Ann. Mag. Nat. Hist., ser. 5, vol. 11, p. 443.

Microporella ciliata, CANU and BASSLER, 1923, U. S. Nat. Mus. Bull. 125, pp. 119, 120, pl. 20, figs. 1-6, pl. 36, figs. 4, 5.

Microporella ciliata, O'DONOGHUE and O'DONOGHUE, 1923, Contr. Canad. Biol., n. s., vol. 1, no. 10, pp. 173, 174

Microporella ciliata, O'DONOGHUE and O'DONOGHUE, 1925, Univ. Wash., Pub. Puget Snd. Biol. Sta. Trans., vol. 5, p. 103.

Microporella ciliata, O'DONOGHUE and O'DONOGHUE, 1926, Contr. Canad. Biol. Fish., n. s., vol. 3, no. 3, pp. 110, 111.

Microporella ciliata, HASTINGS, 1930, Proc. Zool. Soc. London, 1929, p. 727.

Microporella ciliata, OSBURN, 1952, Allan Hancock Pac. Expds., vol. 14, no. 2, p. 377, pl. 44, fig. 1.

DESCRIPTION: Zoaria incrusting. Zooecia distinct, elliptical. Frontal a porous tremocyst, either smooth or roughened. Aperture semicircular, with the proximal edge almost straight. A semilunar aseopore is located immediately proximal to the aperture. One or two avicularia located at the side of, or just proximal to, the aperture. The ovicell globular, large.

MEASUREMENTS: Aperture, 92/103 μ . Zooecia 613/368 μ .

LOCALITIES: *Pleistocene*: West Second and Pacific Avenue, San Pedro, Bath-house Beach, Santa Barbara, California, LACMIP loc. 66-2, Newport Harbor mesa, Newport, LACMIP loc. 136, Newport Bay Road, Newport, California.

OCCURRENCE: *Pleistocene*: Japan (Sakakura, 1935); Italy (Neviani, 1891, 1896, ?1900); Santa Monica, Santa Barbara, Dead Man's Island, San Pedro, California (Canu and Bassler, 1923). *Pliocene*: England, Austria, Italy (Hineks, 1880); Italy (Waters, 1879). *Miocene*: Italy (Waters, 1879); New Zealand (Waters, 1887); Maryland (Ulrich and Bassler, 1904); Florida, Maryland, North Carolina (Canu and Bassler, 1923). *Oligocene*: Iran (Roger, 1943). *Recent*: *Pacific*: Queen Charlotte Islands (Hineks, 1883); California (Canu and Bassler, 1923); Vancouver, British Columbia region (O'Donoghue and O'Donoghue, 1923, 1926); Puget Sound (O'Donoghue and O'Donoghue, 1925); Galapagos Islands, Panama, Colombia (Hastings, 1930); Japan (Okada, 1934, Sakakura, 1935, Okada and Mawatari, 1936); Australia, New Zealand (Hineks, 1880, 1883, Waters, 1879); Philippines (Canu and Bassler, 1929); Hancock stations: California, Channel Islands, Mexico, Baja California, Gulf of California, Costa Rica, Panama, Ecuador, Peru, Galapagos Islands. *Atlantic*: British Isles (Johnston, 1838, 1847, d'Orbigny, 1839, Hineks, 1862, 1880, 1883, Waters, 1879, Smith, 1932, O'Donoghue, 1935, Jones, 1939, Bassindale, 1943); Netherlands (Lacourt, 1949); Spitzbergen, Norway, Greenland (Hineks, 1880, 1883, Waters, 1879, Barroso, 1912, Nordgaard, 1918, 1927, Borg, 1933); Florida, Gulf of Mexico, Puerto Rico, Tortugas Island, Curacao, Panama (Hineks, 1880, 1883, Smitt, 1873, Waters, 1879, Osburn, 1914, 1927, 1940, 1947, Canu and Bassler, 1928); Mediterranean, Africa, Italy (Hineks, 1880, 1883, Waters, 1879,

1908, 1915, Harmer, 1902, Canu and Bassler, 1930); Brazil (Marcus, 1937); Adriatic (Heller, 1867); Cape Verde Islands (Waters, 1918); Labrador, Woods Hole, Chesapeake Bay, Long Island (Osburn, 1912, 1932, Hutchins, 1945); Hudson Bay region (Osburn, 1923, 1932).

DEPTH: Shore (intertidal) to 150 fathoms (137 records).

Microporella californica (Busk), 1856.

Lepralia californica BUSK, 1856, Quart. Jour. Micro. Sci., vol. 4, p. 310, pl. 11, figs. 6, 7.

Microporella ciliata form *californica* HINCKS, 1883, Ann. Mag. Nat. Hist., ser. 5, vol. 11, p. 444, pl. 17, fig. 3.

Microporella californica, ROBERTSON, 1908, Univ. Calif. Pub. Zool., vol. 4, no. 5, pp. 281, 282, pl. 18, figs. 32-34.

Microporella californica, CANU and BASSLER, 1923, U. S. Nat. Mus. Bull. 125, pp. 123, 124, pl. 36, figs. 8-10.

Microporella californica, O'DONOGHUE and O'DONOGHUE, 1923, Contr. Canad. Biol., n. s., vol. 1, no. 10, p. 174.

Microporella californica, O'DONOGHUE and O'DONOGHUE, 1925, Univ. Wash., Pub. Puget Snd. Biol. Sta. Trans., vol. 5, p. 103.

Microporella californica, O'DONOGHUE and O'DONOGHUE, 1926, Contr. Canad. Biol. Fish., n. s., vol. 3, no. 3, p. 111.

Microporella californica, OSBURN, 1952, Allan Hancock Pac. Expds., vol. 14, no. 2, pp. 381, 382, pl. 44, fig. 2.

DESCRIPTION: Zoaria incrusting. Zooecia distinct, ovoid. Frontal wall punctate (tremocyst). Aperture rounded above, with proximal margin straight. The distal rim of the aperture bears the scars of 4-6 spines. On each side and proximal to the aperture are avicularia, pointing obliquely forward. Ascopore lunate. Ovicells globose.

MEASUREMENTS: Aperture, 103/120 $m\mu$. Zooecia, 759/400 $m\mu$.

LOCALITIES: Bath-house Beach, Santa Barbara, California. West Second and Pacific Avenue, San Pedro, California, LACMIP loc. 136, Newport Bay road, Newport, California, Pleistocene.

OCCURRENCE: *Pleistocene*: Santa Monica [Long Wharf Canyon], Santa Barbara, San Pedro, California (Canu and Bassler, 1923). *Recent*: California (Busk, 1856), Robertson, 1908); Queen Charlotte Islands, British Columbia (Hincks, 1883); Vancouver Island region (O'Donoghue and O'Donoghue, 1923, 1926); Puget Sound (O'Donoghue, 1925); Hancock stations, California, Mexico, Baja California, Galapagos Islands.

DEPTH: Shore (intertidal) to 81 fathoms (14 records).

Genus **Fenestrulina** Jullien, 1888**Fenestrulina malusi** (Audouin), 1826.

- Cellepora malusi* AUDOIN and SAVIGNY, 1811, Deser. de l'Egypt Hist. Nat., p. 239, pl. 8, fig. 8.
- Cellepora malusii* AUDOIN, 1826, Explic. de Savigny, p. 239.
- Cellepora californiensis* GABB and HORN, 1862, Jour. Acad. Nat. Sci., Phila., ser. 2, vol. 5, pt. 2, p. 130, pl. 19, fig. 12.
- Microporella Malusii*, HINCKS, 1883, Ann. Mag. Nat. Hist., ser. 5, vol. 11, p. 444.
- Microporella Malusii*, HINCKS, 1884, Ann. Mag. Nat. Hist., ser. 5, vol. 13, p. 57.
- Microporella malusi*, ROBERTSON, 1908, Univ. Calif. Pub. Zool., vol. 4, no. 5, pp. 282-283, pl. 18, figs. 35, 36.
- Microporella malusi*, CANU and BASSLER, 1920, U. S. Nat. Mus. Bull. 106, pp. 418, 419, fig. 123 f-n.
- Fenestrulina malusi*, CANU and BASSLER, 1923, U. S. Nat. Mus. Bull. 125, pp. 114-117, pl. 36, figs. 2, 3, fig. 18 e-i, fig. 19 a-j.
- Microporella malusii*, O'DONOGHUE and O'DONOGHUE, 1923, Contr. Canad. Biol., n. s., vol. 1, no. 10, p. 174.
- Fenestrulina malusii* var. *umbonata* O'DONOGHUE and O'DONOGHUE, 1925, Univ. Wash., Pub. Puget Snd. Biol. Sta. Trans., vol. 5, p. 103.
- Fenestrulina malusii*, O'DONOGHUE and O'DONOGHUE, 1926, Contr. Canad. Biol. Fish., n. s., vol. 3, no. 3, pp. 109, 110.
- Fenestrulina malusi*, OSBURN, 1952, Allan Hancock Pac. Expds., vol. 14, no. 2, pp. 387, 388, pl. 45, fig. 3.

DESCRIPTION: Zoaria incrusting. Zooecia regular, well defined, large, the frontal surface of some of the better preserved specimens with stellate pores. Usually the pores are obscured by secondary calcification. About half-way down the frontal is a median arcuate ascopore. The aperture is rounded above, with a nearly straight proximal edge. Ovicells globular, striated, large.

MEASUREMENTS: Aperture, 86/149 $m\mu$ Zooecia 667/452 $m\mu$.

LOCALITIES: Bath-house Beach, Santa Barbara, California, Pleistocene.

OCCURRENCE: *Pleistocene*: Santa Barbara, California (Gabb and Horn, 1862, Canu and Bassler, 1923). Dizodo Beds, Japan (Sakakura, 1935). *Pliocene*: England (Kendall, 1931). *Miocene*: Australia (MacGillivray, 1895). *Recent*: *Pacific*: California (Robertson, 1908); Queen Charlotte Islands, British Columbia (Hincks, 1883, 1884); Vancouver Island region (O'Donoghue and O'Donoghue, 1923, 1926); Puget Sound (O'Donoghue and O'Donoghue, 1925); Australia (Livingstone, 1926, 1927); Japan (Okada, 1929); India (Robertson, 1921); Hancock stations in California, Channel Islands, Gulf of California, Mexico, Baja California, Galapagos Islands.

Atlantic: England (Johnston, 1847, Hincks 1862, 1880, Prenant, 1931, Jones, 1939); Norway, Greenland (Borg, 1933); St. Helena (Marcus, 1938); Puerto Rico, Gulf of Mexico (Osburn, 1940, Canu and Bassler, 1928); Adriatic (Heller, 1867); Spain (Norman, 1909, Barroso, 1912, 1921).

DEPTH: Shore (intertidal) to 150 fathoms (33 records).

Family EURYSTOMELLIDAE Levinsen, 1909

Genus **Eurystomella** Levinsen, 1909

Eurystomella bilabiata (Hincks), 1882.

Lepralia bilabiata HINCKS, 1882, Ann. Mag. Nat. Hist., ser. 5, vol. 10, pp. 253, 254.

Lepralia bilabiata, HINCKS, 1884, Ann. Mag. Nat. Hist., ser. 5, vol. 13, p. 49, pl. 3, fig. 1.

Lepralia bilabiata, ROBERTSON, 1908, Univ. Calif. Pub. Zool., vol. 4, no. 5, pp. 298-300, pl. 21, figs. 61-64.

Eurystomella bilabiata, CANU and BASSLER, 1923, U. S. Nat. Mus. Bull. 125, p. 142, pl. 37, fig. 6.

Eurystomella bilabiata, O'DONOGHUE and O'DONOGHUE, 1925, Univ. Wash., Pub. Puget Snd. Biol. Sta., Trans., vol. 5, p. 104.

Eurystomella bilabiata, O'DONOGHUE and O'DONOGHUE, 1926, Contr. Canad. Biol. Fish., n. s., vol. 3, pp. 111, 112.

Eurystomella bilabiata, OSBURN, 1952, Allan Hancock Pac. Expds., vol. 14, no. 2, p. 389, pl. 58, fig. 5.

DESCRIPTION: Zoaria incrusting. Zooecia distinct (in spite of heavy secondary calcification), large, short and wide, alternate. Aperture large, bell-shaped. No avicularia. No ovicells found on our specimens.

MEASUREMENTS: Aperture, 218/368 $m\mu$. Zooecia 578/465 $m\mu$.

LOCALITIES: West Second and Pacific Avenue, San Pedro, California, Pleistocene.

OCCURRENCE: *Pleistocene*: Dead Man's Island, San Pedro, California (Canu and Bassler, 1923). Dizodo Beds, Japan (Sakakura, 1936). *Recent*: Queen Charlotte Islands, British Columbia (Hincks, 1882, 1884); Puget Sound region (Robertson, 1908, O'Donoghue and O'Donoghue, 1925); Vancouver Island (O'Donoghue and O'Donoghue, 1926); California (Robertson, 1908); Hancock stations, California, Channel Islands, Mexico.

DEPTH: Shore (intertidal) to 35 fathoms (4 records).

Family SMITTINIDAE Levinsen, 1909

Genus **Porella** Gray, 1848**Porella porifera** (Hincks), 1884.

Porella marsupium form *porifera* HINCKS, 1884, Ann. Mag. Nat. Hist., ser. 5, vol. 13, pp. 50, 51, pl. 4, fig. 4.

Smittina porifera, CANU and BASSLER, 1923, U. S. Nat. Mus. Bull. 125, p. 147, pl. 38, fig. 9.

Porella marsupium var. *porifera*, O'DONOGHUE and O'DONOGHUE, 1923, Contr. Canad. Biol., n. s., vol. 1, no. 10, pp. 182, 183.

Cystisella aviculifera CANU and BASSLER, 1923, U. S. Nat. Mus. Bull. 125, p. 152, pl. 38, fig. 8.

Smittina marsupium var. *porifera*, O'DONOGHUE and O'DONOGHUE, 1926, Contr. Canad. Biol. Fish., n. s., vol. 3, no. 3, p. 115.

Porella porifera, OSBURN, 1952, Allan Hancock Pac. Expds., vol. 14, no. 2, pp. 395, 396, pl. 46, figs. 9-11.

DESCRIPTION: Zoaria incrusting. Zooecia small, short, distinct, with a few large scattered frontal pores as well as marginal pores. Aperture with low lyrula, and surrounded by a very low peristome. The frontal wall contains small, raised, suboral avicularia. Ovicells globular, low, possibly perforate.

MEASUREMENTS: Aperture, 81/103 $m\mu$. Zooecia, 402/218 $m\mu$.

LOCALITIES: LACMIP loc. 66-2 Newport Harbor mesa, Newport, California, Pleistocene.

OCCURRENCE: *Pleistocene*: Santa Monica, Santa Barbara, California (Canu and Bassler, 1923). Dizodo Beds, Japan (Sakakura, 1935). *Pliocene*: New Zealand (Waters, 1887). *Recent: Pacific*: Queen Charlotte Islands, British Columbia (Hincks, 1884); Vancouver Island region (O'Donoghue and O'Donoghue, 1923, 1926); Hancock stations, California, Channel Islands, Mexico, Baja California, Colombia, Costa Rica. *Atlantic*: Greenland, Norway, Spitzbergen (Nordgaard, 1895, 1918, Norman, 1903, Bidentkap, 1905, Osburn, 1936); Canada, Labrador (Osburn, 1912, Borg, 1933, Osburn, 1932, Hincks, 1888).

DEPTH: Shore (intertidal) to 130 fathoms (25 records).

Genus **Smittina** Norman, 1903**Smittina landsborovi** (Johnston), 1847.

Lepralia Landsborovii JOHNSTON, 1847, Hist. Brit. Zoophytes, 2nd ed., p. 310, pl. 54, fig. 9.

- Smittia landsborovi*, ROBERTSON, 1908, Univ. Calif. Publ. Zool., vol. 4, no. 5, p. 305, pl. 23, fig. 74.
- Smittia landsborovi*, CANU and BASSLER, 1920, U. S. Nat. Mus. Bull. 106, p. 457.
- Smittia landsborovii*, O'DONOGHUE and O'DONOGHUE, 1923, Contr. Canad. Biol., n. s., vol. 1, no. 10, pp. 184, 185.
- Smittina landsborovii*, O'DONOGHUE and O'DONOGHUE, 1925, Univ. Wash., Pub. Puget Snd. Biol. Sta., Trans., vol. 5, p. 104.
- Smittina landsborovii*, O'DONOGHUE and O'DONOGHUE, 1926, Contr. Canad. Biol. Fish., n. s., vol. 3, no. 3, pp. 112, 113.
- Smittina landsborovi*, OSBURN, 1952, Allan Hancock Pac. Expds., vol. 14, no. 2, pp. 400, 401, pl. 47, figs. 1, 2.

DESCRIPTION: Zoaria incrusting. Zooecia distinct, alternate, with marginal pores. Aperture with broad lyrula, surrounded by a peristome. Suboral avicularia small, pointing proximally. No ovicell on specimens.

MEASUREMENTS: Aperture, 173/195 $m\mu$. Zooecia 862/437 $m\mu$.

LOCALITIES: Bath-house Beach, Santa Barbara, California, Pleistocene.

OCCURRENCE: *Pliocene*: Australia, New Zealand (Waters, 1885, 1887). *Recent*: *Pacific*: California (Robertson, 1908); Vancouver Island region (O'Donoghue and O'Donoghue, 1923, 1926); Puget Sound (O'Donoghue and O'Donoghue, 1925); Japan (Okada and Mawatari, 1936); Indian Ocean (Thornely, 1912); Hancock stations, California, Channel Islands, Mexico, Baja California, Galapagos Islands. *Atlantic*: England (Johnston, 1847, Alder, 1857, 1864, Hincks, 1862, 1880), Arctic, Norway, Greenland, Spitzbergen (Busk, 1861, Hincks, 1880, Nordgaard, 1895, Bidekap, 1905).

DEPTH: 6 to 81 fathoms (25 records).

REMARKS: This appears to be the first fossil record of this species from the Pacific coast of North America.

***Smittina maccullochae* Osburn 1952.**

- Smittina maccullochae* OSBURN, 1952, Allan Hancock Pac. Expds., vol. 14, no. 2, pp. 405, 406, pl. 48, figs. 5, 6.
- Porella collifera* CANU and BASSLER, 1923, U. S. Nat. Mus. Bull. 125, pp. 148, 149, pl. 38, figs. 10-15.

DESCRIPTION: Zoaria incrusting. Zooecia large, with a perforate frontal. Aperture surrounded by a high tubular peristome with a proximal suboral avicularia. Lyrula large. Ovicell globose, porous.

MEASUREMENTS: Aperture, 164/130 $m\mu$. Zooecia, 978/459 $m\mu$.

LOCALITIES: Bath-house Beach, Santa Barbara, California, Pleistocene.

OCCURRENCE: *Pleistocene*: Santa Monica, Santa Barbara, California

(Canu and Bassler, 1923). *Recent: Pacific:* California, Channel Islands, Mexico (Osburn, 1952).

Genus **Parasmittina** Osburn, 1952

Parasmittina trispinosa (Johnston), 1825.

- Discopora trispinosa* JOHNSTON, 1825, Edinbh. Phil. Jour., vol. 13, p. 222.
Lepralia trispinosa, BUSK, 1856, Quart. Journ. Mic. Sci., vol. 4, p. 178.
Smittia trispinosa, HINCKS, 1884, Ann. Mag. Nat. Hist., ser. 5, vol. 13, p. 51.
Smittia trispinosa, ROBERTSON, 1900, Proc. Wash. Acad. Sci., vol. 2, p. 327.
Smittia trispinosa, ROBERTSON, 1908, Univ. Calif. Pub. Zool., vol. 4, no. 5, pp. 302, 303, pl. 22, figs. 68-70.
Smittia trispinosa, CANU and BASSLER, 1923, U. S. Nat. Mus. Bull. 125, pp. 143, 144, pl. 22, figs. 7-14.
Smittia trispinosa, O'DONOGHUE and O'DONOGHUE, 1923, Contr. Canad. Biol., n. s., vol. 1, no. 10, p. 185.
Smittina trispinosa, O'DONOGHUE and O'DONOGHUE, 1925, Univ. Wash., Pub. Puget Snd. Biol. Sta., Trans., vol. 5, p. 105.
Smittina trispinosa, O'DONOGHUE and O'DONOGHUE, 1926, Contr. Canad. Biol. Fish., n. s., vol. 3, no. 3, pp. 113, 114.
Smittina trispinosa, HASTINGS, 1930, Proc. Zool. Soc. London, 1929, pt. 4, p. 726, pl. 11, fig. 55.
Smittina trispinosa, CANU and BASSLER, 1930, Proc. U. S. Nat. Mus., no. 2810, vol. 76, art. 13, pp. 27-29, pl. 4, figs. 1-5.
Parasmittina trispinosa, OSBURN, 1952, Allan Hancock Pac. Expds., vol. 14, no. 2, pp. 412-414, pl. 49, figs. 7, 8.

DESCRIPTION: Zoaria incrusting. Zooecia distinct on some specimens, obscured by secondary calcification on others, alternate. Aperture with well developed lyrula, surrounded by a low peristome. Avicularia scattered near the aperture, with no trace of sub-oral avicularia. Few gigantic interzooecial avicularia, which may be almost as large as the zooecia. The distal rim of the peristome bears the scars denoting the points where 2 or 3 spines were once attached. Ovicell large, globular, porous.

MEASUREMENTS: Aperture, 76/86 μ . Zooecia, 471/264 μ .

LOCALITIES: Bath-house Beach, Santa Barbara, West Second and Pacific Avenue, San Pedro, LACMIP loc. 130-7, opposite Berth 79, Los Angeles Harbor, Timms' Point formation, California, Pleistocene.

OCCURRENCE: *Pleistocene:* South Carolina, Florida (Canu and Bassler, 1923); Sicily (Neviani, 1896). *Pliocene:* Florida, South Carolina, (Canu and Bassler, 1923). *Miocene:* North Carolina (Canu and Bassler, 1923); Australia (Waters, 1882). *Recent: Pacific:* Mexico (Busk, 1856);

Alaska (Robertson, 1900, 1908); Queen Charlotte Islands, British Columbia (Hincks, 1884); Vancouver Island (O'Donoghue and O'Donoghue, 1923, 1926); Puget Sound (O'Donoghue and O'Donoghue, 1925); Panama (Hastings, 1930); Galapagos Islands (Canu and Bassler, 1930); Australia (Livingstone, 1926, 1927; Japan (Sakakura, 1935); India (Robertson, 1921); Hancock stations, California, Channel Islands, Gulf of California, Mexico, Baja California, Colombia, Galapagos Islands, Peru. *Atlantic*: England (Johnston, 1838, 1847, Alder, 1857, Hincks, 1862, 1880, Smith, 1932); Denmark, Norway, Iceland, Arctic (Hincks, 1877, 1880, Levinsen, 1894, Nordgaard, 1895, 1907, 1912, 1918, 1927); Florida, Tortugas, Venezuela (Smitt, 1873, Osburn, 1914, 1947); Labrador, Woods Hole, Massachusetts, Newfoundland (Packard, 1863, Hincks, 1877, Osburn, 1912); Brazil (Marcus, 1937).

DEPTH: Shore (intertidal) to 150 fathoms (99 records).

Parasmittina californica (Robertson), 1908.

Mucronella californica ROBERTSON, 1908, Univ. Calif. Pub. Zool., vol. 4, no. 5, pp. 308, 309, pl. 23, fig. 80.

(*non*) *Smittina californiensis* CANU and BASSLER, 1923, U. S. Nat. Mus. Bull. 125, p. 146, pl. 37, figs. 7-9.

Parasmittina californica, OSBURN, 1952, Allan Hancock Pac. Expds., vol. 14, no. 2, pp. 415, 416, pl. 51, figs. 8-11.

DESCRIPTION: Zoaria incrusting. Zooecia distinct, alternate. Frontal porous, bears small raised sub-oral avicularia, occasional very large lateral spatulate avicularia, placed to one side of the aperture, may be found. Aperture surrounded by low peristome, with a lyrula. Ovicells globose, perforate.

MEASUREMENTS: Aperture, 124/138 $m\mu$. Zooecia, 567/383 $m\mu$.

LOCALITIES: West Second and Pacific Avenue, San Pedro, California, Pleistocene. Bath-house Beach, Santa Barbara, California, Pleistocene.

OCCURRENCE: *Recent*: California, Santa Catalina Island (Robertson, 1908); Hancock stations, Channel Islands, Mexico, Gulf of California, Galapagos Islands.

DEPTH: 23 to 150 fathoms (9 records).

REMARKS: Not previously recorded as fossil.

Parasmittina collifera (Robertson), 1908.

Smittina collifera ROBERTSON, 1908, Univ. Calif. Pub. Zool., vol. 4, no. 5, pp. 304, 305, pl. 23, figs. 72, 73.

(non) *Porella collifera* CANU and BASSLER, 1923, U. S. Nat. Mus. Bull. 125, pp. 148, 149, pl. 38, figs. 10-15.

Smittia collifera, O'DONOGHUE and O'DONOGHUE, 1923, Contr. Canad. Biol., n. s., vol. 1, no. 10, p. 185.

Smittina collifera, O'DONOGHUE and O'DONOGHUE, 1925, Univ. Wash., Pub. Puget Snd. Biol. Sta., Trans., vol. 5, p. 104.

Smittina collifera, O'DONOGHUE and O'DONOGHUE, 1926, Contr. Canad. Biol. Fish., n. s., vol. 3, no. 3, p. 114.

Parasmittina collifera, OSBURN, 1952, Allan Hancock Pac. Expds., vol. 14, no. 2, pp. 416-418, pl. 49, figs. 9-11.

DESCRIPTION: Zoaria incrusting. Zooecia distinct, alternate, with marginal pores. Aperture with lyrula and surrounded by peristome. No suboral avicularia. Occasional lateral avicularia located at the side of, and pointing toward, the aperture. No ovicells present on our specimens.

MEASUREMENTS: Aperture, 127/138 $m\mu$. Zooecia, 437/243 $m\mu$.

LOCALITIES: Bath-house Beach, Santa Barbara, California, Pleistocene.

OCCURRENCE: *Recent: Pacific:* California (Robertson, 1908); Vancouver Island region (O'Donoghue and O'Donoghue, 1923, 1926); Puget Sound (O'Donoghue and O'Donoghue, 1925); Hancock stations, California, Channel Islands, Mexico.

DEPTH: Shore (intertidal) to 81 fathoms (7 records).

REMARKS: This is the first record of this species from fossil deposits.

Genus *Mucronella* Hincks, 1880

Mucronella microstoma (Norman), 1864.

Lepralia microstoma NORMAN, 1864, Ann. Mag. Nat. Hist., ser. 3, vol. 13, p. 87, pl. 11, fig. 2.

(non) *Mucronella microstoma* O'DONOGHUE and O'DONOGHUE, 1923, Contr. Canad. Biol., n. s., vol. 1, no. 10, p. 188.

DESCRIPTION: Zoaria incrusting, heavily coated by secondary calcification. Zooecia distinct, ovoid. Aperture small, surrounded by a thick mucronate peristome. No intact ovicells on our specimens.

MEASUREMENTS: Aperture, 92/115 $m\mu$. Zooecia, 322/218 $m\mu$.

LOCALITIES: LACMIP loc. 66-2, Newport Harbor mesa, Newport, California, Pleistocene.

OCCURRENCE: *Recent: Atlantic:* British Isles (Norman, 1864, Hincks, 1880); France (Canu, 1924).

DEPTH: 15 to 205 fathoms (4 records).

REMARKS: Not previously known as fossil.

Family RETEPORIDAE Smitt, 1867

Genus **Phidolopora** Gabb and Horn, 1862

Phidolopora labiata Gabb and Horn, 1862.

Phidolopora labiata GABB and HORN, 1862, Jour. Acad. Nat. Sci., Phila., ser. 2, vol. 5, pt. 2, pp. 138, 139, pl. 19, fig. 21.

Retepora pacifica ROBERTSON, 1908, Univ. Calif. Publ. Zool., vol. 4, no. 5, pp. 310, 311, pl. 24, figs. 81-84.

Phidolopora pacifica, CANU and BASSLER, 1923, U. S. Nat. Mus. Bull. 125, p. 154, pl. 39, figs. 1-7.

Phidolopora labiata, CANU and BASSLER, 1923, U. S. Nat. Mus. Bull. 125, pp. 154, 155, pl. 39, figs. 13-17.

Retepora pacifica, O'DONOGHUE and O'DONOGHUE, 1923, Contr. Canad. Biol., n. s., vol. 1, no. 10, p. 189.

Phidolopora pacifica, O'DONOGHUE and O'DONOGHUE, 1925, Univ. Wash., Pub. Puget Snd. Biol. Sta., Trans., vol. 5, p. 106.

Phidolopora pacifica, O'DONOGHUE and O'DONOGHUE, 1926, Contr. Canad. Biol. Fish., n.s., vol. 3, no. 3, pp. 118, 119.

DESCRIPTION: Zoaria in the fossil material consisting of fragments of what were in life large convoluted masses, erect. Fenestrae oval, twice as long as wide. On the dorsal side at the base of each fenestra is located an elevated avicularium, with the mandible portion directed downward. Zooecia small, frontal wall granular, sloping upward from the sides to the midline. On some older zooecia there is a high peristome, with a well-defined sinus below, which develops an elevated avicularium. Ovicells, when present, small and set far back, united secondarily to the zooecia by growth of the peristome.

MEASUREMENTS: Peristome dia. 162 μ . Zooecia 667/360 μ .

LOCALITIES: West Second and Pacific Avenue, San Pedro, California, Pleistocene. Bath-house Beach, Santa Barbara, California, Pleistocene. LACMIP loc. 64, "Hilltop Quarry," Lomita Marl, San Pedro, California, Pleistocene.

OCCURRENCE: *Pleistocene*: Santa Monica, California, Santa Barbara, California, Dead Man's Island, San Pedro (harbor), California (Canu and Bassler, 1923); Santa Barbara, California (Gabb and Horn, 1862). *Recent*: *Pacific*: California (Robertson, 1908); Vancouver Island, British Columbia (O'Donoghue and O'Donoghue, 1923, 1926); Puget Sound region (Robert-

son, 1908, O'Donoghue and O'Donoghue, 1925); Hancock stations, Oregon, California, Channel Islands, Mexico, Baja California, Gulf of California, Costa Rica, Galapagos Islands, Peru.

DEPTH: 8 to 131 fathoms (86 records).

Genus **Rhynchozoon** Hincks, 1895

Rhynchozoon tumulosum (Hincks), 1882.

Schizoporella tumulosa HINCKS, 1882, Ann. Mag. Nat. Hist., ser. 5, vol. 10, p. 252.

Schizoporella tumulosa, HINCKS, 1883, Ann. Mag. Nat. Hist., ser. 5, vol. 11, pp. 447, 448, pl. 18, fig. 2.

Schizoporella tumulosa, ROBERTSON, 1908, Univ. Calif. Pub. Zool., vol. 4, no. 5, pp. 293, 294, pl. 20, fig. 53.

Schizoporella tumulosa, O'DONOGHUE and O'DONOGHUE, 1923, Contr. Canad. Biol., n. s., vol. 1, no. 10, p. 179.

Schizoporella tumulosa, O'DONOGHUE and O'DONOGHUE, 1925, Univ. Wash., Pub. Puget Snd. Biol. Sta., Trans., vol. 5, p. 102.

Schizoporella tumulosa, O'DONOGHUE and O'DONOGHUE, 1926, Contr. Canad. Biol. Fish., n. s., vol. 3, no. 3, p. 102.

Rhynchozoon tumulosum, OSBURN, 1952, Allan Hancock Pac. Expds., vol. 14, no. 2, pp. 458, 459, pl. 54, figs. 4, 5, 12.

DESCRIPTION: Zoaria incrusting, heavily calcified. Zooecia large, ovoid, frontal wall raised along center line, sloping to lateral margins. Aperture circular, containing a shallow sinus in the proximal rim. Below the aperture and to one side may be found evidence of an elevated avicularium. Avicularia more common in the older zoaria, also found frontally, but must be distinguished from the sub-oral type. Ovicells smooth, globular, immersed.

MEASUREMENTS: Aperture, 57/80 $m\mu$. Zooecia, 402/276 $m\mu$.

LOCALITIES: West Second and Pacific Avenue, San Pedro, California, Pleistocene. LACMIP loc. 66-2, Newport Harbor mesa, Newport, California, Pleistocene.

OCCURRENCE: *Recent: Pacific*: Queen Charlotte Islands (Hincks, 1882, 1883); Vancouver Island Region (O'Donoghue and O'Donoghue, 1923, 1926); Puget Sound region (O'Donoghue and O'Donoghue, 1925); California (Robertson, 1908); Hancock stations, California, Channel Islands, Mexico, Baja California, Oregon.

DEPTH: Shore (intertidal) to 235 fathoms (48 records).

REMARKS: Not previously known as fossil.

Family CHEILOPORINIDAE Bassler, 1936

Genus **Hippopodinella** Barroso, 1924**Hippopodinella adpressa** (Busk), 1854.

Lepralia adpressa BUSK, 1854, Cat. Mar. Polyzoa Brit. Mus., pt. 2, p. 82, pl. 102, figs. 3, 4.

Lepralia adpressa, BUSK, 1856, Quart. Jour. Mic. Sci., vol. 4, p. 178.

Hippopodinella adpressa, HASTINGS, 1930, Proc. Zool. Soc. London, 1929, pt. 2, p. 279.

Hippopodinella adpressa, OSBURN, 1952, Allan Hancock Pac. Expds., vol. 14, no. 2, p. 467, pl. 57, fig. 6.

DESCRIPTION: Zoaria incrusting. Zooecia ovoid, immersed, somewhat indistinct. Frontal wall pitted. Aperture rounded distally, contracted sharply just below the middle, with the proximal rim only slightly curved. Lateral walls of the aperture bearing two prominent cardelles. Ovicell endozoocial.

MEASUREMENTS: Aperture, 162/138 $m\mu$. Zooecia 506/325 $m\mu$.

LOCALITIES: West Second and Pacific Avenue, San Pedro, California, Pleistocene.

OCCURRENCE: *Recent: Pacific:* India (Robertson, 1921); Panama, Galapagos Islands (Hastings, 1930); Mexico (Busk, 1856); Hancock stations, Mazatlan, Mexico, Baja California, Gulf of California, Costa Rica, Panama, Ecuador, Galapagos. *Atlantic:* England (Hincks, 1862); France (Calvet, 1902); Italy (Norman, 1909).

DEPTH: Shore (intertidal) to 92 fathoms (29 records).

REMARKS: Not previously found as a fossil.

Family PHYLACTELLIDAE Canu and Bassler, 1917

Genus **Lagenipora** Hincks, 1877**Lagenipora punctulata** (Gabb and Horn), 1862.

Entalophora punctulata GABB and HORN, 1862, Jour. Acad. Nat. Sci., Phila., ser. 2, vol. 5, pt. 2, pl. 171, pl. 21, fig. 61.

Lagenipora spinulosa HINCKS, 1884, Ann. Mag. Nat. Hist., ser. 5, vol. 13, pp. 57, 210, 211, pl. 3, fig. 4, pl. 9, fig. 4.

Lagenipora spinulosa, ROBERTSON, 1908, Univ. Calif. Pub. Zool., vol. 4, no. 5, pp. 283, 284, pl. 18, fig. 37.

Tubucellaria punctulata, CANU and BASSLER, 1923, U. S. Nat. Mus. Bull. 125, p. 170, pl. 40, figs. 1-4.

- Lagenipora erecta* O'DONOGHUE and O'DONOGHUE, 1923, Contr. Canad. Biol., n. s., vol. 1, no. 10, pp. 175, 176, pl. 3, fig. 22.
- Lagenipora erecta*, O'DONOGHUE and O'DONOGHUE, 1925, Univ. Wash., Pub. Puget Snd. Biol. Sta., Trans., vol. 5, p. 106.
- Lagenipora erecta*, O'DONOGHUE and O'DONOGHUE, 1926, Contr. Canad. Biol. Fish., n. s., vol. 3, no. 3, p. 120.
- Lagenipora punctulata*, OSBURN, 1952, Allan Hancock Pac. Expds., vol. 14, no. 2, pp. 485, 486, pl. 60, figs. 1, 2.

DESCRIPTION: Zoaria erect, consisting of tubular stems arising from a small base. Zoecia tubular or flask-shaped, the lower, somewhat swollen portion, forming a part of the stem, with the upper tubular neck standing well out. The neck is wider at the oral extremity, with a tendency to flare. The top of the neck may or may not have traces of small avicularia borne on low processes. Aperture oval. Ovicells, when present, lie at the lower end of the tubular neck, between it and the stem. It has a large crescent-shaped flattened area in front, perforated by pores.

MEASUREMENTS: Diameter peristome, 184 μ . Diameter aperture, 126 μ .

LOCALITIES: West Second and Pacific Avenue, San Pedro, California, Pleistocene. Bath-house Beach, Santa Barbara, California, Pleistocene. LACMIP loc. 66-2, Newport Harbor mesa, Newport, California, Pleistocene. LACMIP loc. 64, "Hilltop Quarry," Lomita Marl, San Pedro, California, Pleistocene. LACMIP loc. 130-7, opp. Berth 79, Los Angeles harbor, Timm's Point formation, Pleistocene.

OCCURRENCE: *Pleistocene*: Santa Barbara, California (Gabb and Horn, 1862); Santa Barbara, Santa Monica, Dead Man's Island, San Pedro [harbor], California (Canu and Bassler, 1923). *Recent: Pacific*: Queen Charlotte Islands, British Columbia (Hineks, 1884); Vancouver Island region (O'Donoghue and O'Donoghue, 1923, 1926); Puget Sound, Washington (O'Donoghue and O'Donoghue, 1925); California (Robertson, 1908); Hancock stations, California, Channel Islands, Baja California, Mexico, Galapagos Islands.

DEPTH: Shore (intertidal) to 150 fathoms (121 records).

Family CELLEPORIDAE Busk, 1852

Genus **Holoporella** Waters, 1909

Holoporella brunnea (Hineks), 1884.

Cellepora brunnea HINCKS, 1884, Ann. Mag. Nat. Hist., ser. 5, vol. 13, p. 56.

Smittia californiensis ROBERTSON, 1908, Univ. Calif. Pub. Zool., vol. 4, no. 5, pp. 303, 304, pl. 22, fig. 71.

- Cellepora brunnea*, O'DONOGHUE and O'DONOGHUE, 1926, *Contr. Canad. Biol. Fish.*, n. s., vol. 3, no. 3, p. 121.
- Holoporella brunnea*, HASTINGS, 1930, *Proc. Zool. Soc. London*, 1929, p. 731, pl. 26, figs. 108-110.
- Holoporella brunnea*, OSBURN, 1952, *Allan Hancock Pac. Expds.*, vol. 14, no. 2, pp. 496, 497, pl. 62, figs. 10-12.

DESCRIPTION: Zoaria incrusting. Zooecia crowded, barrel-shaped, with some elevated, others immersed. Surface smooth, punctured along the margin. Aperture arched above, lower lip curved slightly outward, with a small notch rounded below, and contracted at the opening with two minute denticular projections. Large avicularia scattered among the zooecia.

MEASUREMENTS: Aperture, 105/149 $m\mu$. Zooecia 546/348 $m\mu$.

LOCALITIES: West Second and Pacific Avenue, San Pedro, California, LACMIP loc. 66-2, Newport Harbor mesa, Newport, California, LACMIP loc. 136, Newport Bay road, Newport, California, Pleistocene.

OCCURRENCE: *Recent: Pacific*: Queen Charlotte Islands, British Columbia (Hincks, 1884); Vancouver Island region, (O'Donoghue and O'Donoghue, 1926); California (Robertson, 1908); Galapagos, Panama, Colombia (Hastings, 1930); Hancock stations, California, Channel Islands, Mexico, Baja California, Galapagos, Panama, Costa Rica.

DEPTH: Shore (intertidal) to 150 fathoms (118 records).

REMARKS: Not previously recorded as a fossil.

Genus *Costazia* Neviani, 1895

Costazia costazi (Audouin), 1826.

- Cellepora costazii* AUDOUIN, 1826, in Savigny, *Descr. de l'Egypte Hist. Nat.* vol. 1, pt. 4, p. 237, pl. 7, fig. 4.
- (*non*) *Cellepora costazi*, ROBERTSON, 1908, *Univ. Calif. Pub. Zool.*, vol. 4, no. 5, p. 313, pl. 24, fig. 89.
- Costazzia (Cellepora) costazzii*, CANU and BASSLER, 1920, *U. S. Nat. Mus. Bull.* 106, p. 603, fig. 180a-c.
- Cellepora costazii*, O'DONOGHUE and O'DONOGHUE, 1923, *partim*, *Contr. Canad. Biol.*, n. s., vol. 1, no. 10, p. 190.
- (?) *Costazzia costazzii*, O'DONOGHUE and O'DONOGHUE, 1925, *Univ. Wash., Pub. Puget Snd. Biol. Sta., Trans.*, vol. 5, p. 106.
- Costazzia costazii*, O'DONOGHUE and O'DONOGHUE, 1926, *partim*, *Contr. Canad. Biol.*, *Fish.*, n. s., vol. 3, no. 3, p. 121.
- Costazia costazi*, OSBURN, 1952, *Allan Hancock Pac. Expds.*, vol. 14, no. 2, p. 506, pl. 62, figs. 3, 4.

DESCRIPTION: Zoaria small, incrusting. Zoecia irregular, raised, with many marginal pores. Aperture subcircular, with a well defined rounded sinus. Peristome raised, bearing evidence of a small avicularium on each side of the aperture. Ovicells, when present, rounded, semi-lunar in appearance.

MEASUREMENTS: Aperture, 161/115 $m\mu$. Zoecia, 470/353 $m\mu$.

LOCALITIES: LACMIP loc. 66-2, Newport Harbor mesa, Newport, California, Pleistocene.

OCCURRENCE: *Pliocene*: Italy (Manzoni, 1870, Waters, 1879). *Recent*: *Pacific*: India (Robertson, 1921); Vancouver Island region (O'Donoghue and O'Donoghue, 1923, 1926); Puget Sound, Washington (O'Donoghue and O'Donoghue, 1925); Japan (Okada, 1929, 1933, 1934, Okada and Mawatari, 1935); Hancock stations, California, Channel Islands. *Atlantic*: British Isles (Hincks, 1880, Prenant, 1924, O'Donoghue and Watteville, 1935, Bassindale, 1941, Waters, 1879); Azores, Canary Islands (Calvet, 1907, 1931, Barroso, 1912, Jullien and Calvet, 1903); France (Calvet, 1902, 1907, 1927, 1931). Arctic, Norway, Sweden (Smitt, 1867, Nordgaard, 1896, 1906, Levensen, 1909); Italy (Waters, 1879, Hincks, 1880, Marcus, 1920, Barroso, 1912); South Africa (O'Donoghue and Watteville, 1935, Stephenson, 1938, Eyre, 1939); North Africa (Canu and Bassler, 1930); Brazil, (Marcus, 1937); Puerto Rico (Osburn, 1940).

DEPTH: 6 to 1069 fathoms (25 records).

Costazia robertsonae (Canu and Bassler), 1923.

Costazia robertsoniae CANU and BASSLER, 1923, U. S. Nat. Mus. Bull. 125, p. 181, pl. 39, figs. 10-12.

Cellepora costazi, ROBERTSON, 1908, *partim*, Univ. Calif. Pub. Zool. vol. 4, no. 5, p. 313, pl. 24, fig. 190.

Cellepora costazii, O'DONOGHUE and O'DONOGHUE, 1923, *partim*, Contr. Canad. Biol., n. s., vol. 1, no. 10, p. 190.

Costazia costazii, O'DONOGHUE and O'DONOGHUE, 1926, *partim*, Contr. Canad. Biol. Fish., n. s., vol. 3, no. 3, p. 121.

Costazia robertsonae, OSBURN, 1952, Allan Hancock Pac. Expds., vol. 14, no. 2, pp. 507, 508, pl. 62, figs. 1, 2.

DESCRIPTION: Zoaria small nodular. Zoecia rough, raised, with areolar pores partially obscured by secondary calcification. Aperture oval, rounded above, with a proximal sinus that is "V" shaped in the well preserved specimens. Peristome with a pair of oral avicularia, with a scar of an occasional third avicularia distally. Interzoecial avicularia wide, ovoid. Ovicells wanting on our specimen.

MEASUREMENTS: Aperture, 156/104 $m\mu$. Zooecia, 543/248 $m\mu$.

LOCALITIES: LACMIP loc. 76, "lumber yard," San Pedro, California, Pleistocene.

OCCURRENCE: *Pleistocene*: Santa Monica [Rustic Canyon], California, (Canu and Bassler, 1923). *Recent: Pacific*: California (Robertson, 1908); Vancouver Island region (O'Donoghue and O'Donoghue, 1923, 1926); Hancock stations, California, Channel Islands, Mexico.

DEPTH: Shore (intertidal) to 50 fathoms (12 records).

Sub-order CYCLOSTOMATA Busk, 1852

Division I, **TUBULIPORINA** Hagenow, 1851

Family ONCOUSOECIDAE Canu, 1918

Genus **Proboscina** Audouin, 1826

Proboscina major (Johnston), 1847.

Alecto major JOHNSTON, 1847, Hist. Brit. Zoophytes, 2nd Ed., p. 281, pl. 49, figs. 3, 4.

Stomatopora major, HINCKS, 1884, Ann. Mag. Nat. Hist., ser. 5, vol. 13, p. 204.

Stomatopora major, O'DONOGHUE and O'DONOGHUE, 1923, Contr. Canad. Biol., n. s., vol. 1, no. 10, p. 153.

Diaperoecia major, O'DONOGHUE and O'DONOGHUE, 1926, Contr. Canad. Biol. Fish., n. s., vol. 3, no. 3, p. 69.

Oncouoecia (Proboscina) major, CANU and BASSLER, 1930, Proc. U. S. Nat. Mus., no. 2810, vol. 76, art. 13, pp. 46, 47.

Proboscina major, OSBURN, 1953, Allan Hancock Pac. Expds., vol. 14, no. 3, pp. 621, 622, pl. 65, fig. 5.

DESCRIPTION: Zoaria incrusting. Zooecia tubular, erect. Apertures free, arranged in rows of one or two zooecia in linear succession. Ovicell on our specimen broken, low, elongate, bulbous.

MEASUREMENTS: Diameter peristome, 460 $m\mu$. Diameter aperture 187 $m\mu$.

LOCALITIES: West Second and Pacific Avenue, San Pedro, California, Pleistocene.

OCCURRENCE: *Pliocene*: England, Italy (Waters, 1887). *Recent: Pacific*: Queen Charlotte Islands (Hincks, 1884); Vancouver Island region (O'Donoghue and O'Donoghue, 1923, 1926); Hawaii (Canu and Bassler, 1927); Galapagos Islands (Canu and Bassler, 1930); Hancock stations, Mexico, Ecuador, Galapagos Islands.

DEPTH: Shore (intertidal) to 170 fathoms (14 records).

REMARKS: This is the first record of this species as fossil on the Pacific coast of North America.

Genus **Filisparsa** d'Orbigny, 1853

Filisparsa clarki Canu and Bassler, 1923.

Filisparsa clarki CANU and BASSLER, U. S. Nat. Mus. Bull. 125, pp. 195, 196, pl. 41, figs. 11-19.

DESCRIPTION: Zoaria erect, branching, with transverse dorsal striations. Zooecia connate, except at distal ends, which rise as tubular extensions.

MEASUREMENTS: Diameter peristome, 207 $m\mu$. Diameter aperture, 126 $m\mu$.

LOCALITIES: Bath-house Beach, Santa Barbara, California, Pleistocene.

OCCURRENCE: *Pleistocene*: Santa Barbara, California, Dead Man's Island, San Pedro [harbor], California (Canu and Bassler, 1923).

DEPTH: At this time there are no records of this species in living form.

Family DIAPEROECIDAE Canu, 1918

Genus **Diaperoecia** Canu, 1918

Diaperoecia californica (d'Orbigny), 1852.

Idmonea californica D'ORBIGNY, 1852, Paleon. Francaise, terr. cret., vol. 5, Bryozoaires, p. 732.

Idmonea californica, CONRAD, 1855, Proc. Acad. Nat. Sci., Phila., vol. 7, p. 441.

Idmonea californica, GABB and HORN, 1862, Jour. Acad. Nat. Sci., Phila., ser. 2, vol. 5, pt. 2, pp. 168, 169, pl. 21, fig. 56.

Idmonea californica, ROBERTSON, 1910, Univ. Calif. Pub. Zool., vol. 6, no. 12, pp. 253, 254, pl. 23, figs. 39-41.

Idmonea californica, CANU and BASSLER, 1923, U. S. Nat. Mus. Bull. 125, p. 199, pl. 43, figs. 1-9.

Idmonea californica, O'DONOGHUE and O'DONOGHUE, 1923, Contr. Canad. Biol., n. s., vol. 1, no. 10, p. 154.

Idmonea californica, O'DONOGHUE and O'DONOGHUE, 1926, Contr. Canad. Biol. Fish., n. s., vol. 3, no. 3, pp. 73, 74.

Diaperoecia californica, OSBURN, 1953, Allan Hancock Pac. Expd., vol. 14, no. 3, pp. 642-644, pl. 67, figs. 1, 2.

DESCRIPTION: Zoaria erect. Zooecia tubular, long, extending one behind the other. Zooecial openings may be found in transverse rows, with as many as five or six to a row.

MEASUREMENTS: Diameter aperture 207 μ . Diameter peristome 312 μ .

LOCALITIES: Bath-house Beach, Santa Barbara, California, Pleistocene. West Second and Pacific Avenue, San Pedro, California, Pleistocene. LACMIP loc. 130-7, opposite Berth 79 Los Angeles harbor, Timm's Point formation, Pleistocene. LACMIP loc. 76, "lumber yard," San Pedro, California, A. T. Tieje, collector, Pleistocene.

OCCURRENCE: *Pleistocene*: Santa Barbara, California (Conrad, 1855, Gabb and Horn, 1862); San Pedro, California (Conrad, 1855); Santa Monica, Santa Barbara, California, Dead Man's Island, San Pedro, California (Canu and Bassler, 1923). *Recent: Pacific*: California (d'Orbigny, 1852, Robertson, 1910); Vancouver Island region (O'Donoghue and O'Donoghue, 1923, 1926); Hancock stations, California, Channel Islands, Mexico, Gulf of California, Costa Rica.

DEPTH: Shore (intertidal) to 150 fathoms (84 records).

Family TUBULIPORIDAE Johnston, 1838

Genus *Tubulipora* Lamarek, 1816

Tubulipora tuba (Gabb and Horn), 1862.

- Semitubigera tuba* GABB and HORN, 1862, Jour. Acad. Nat. Sci., Phila., ser. 2, vol. 5, pt. 2, p. 169, pl. 21, fig. 57.
- Tubulipora occidentalis* ROBERTSON, 1910, Univ. Calif. Pub. Zool., vol. 6, no. 12, p. 249, pl. 22, figs. 29-31.
- Tubulipora occidentalis*, CANU and BASSLER, 1920, U. S. Nat. Mus. Bull. 106, p. 757, fig. 246 k.
- Tubulipora tuba*, CANU and BASSLER, 1923, U. S. Nat. Mus. Bull. 125, p. 198, pl. 42, figs. 18-23.
- Tubulipora occidentalis*, O'DONOGHUE and O'DONOGHUE, 1923, Contr. Canad. Biol., n. s., vol. 1, no. 10, p. 150.
- Tubulipora tuba*, O'DONOGHUE and O'DONOGHUE, 1925, Univ. Wash., Pub. Puget Snd. Biol. Sta., Trans., vol. 5, p. 95.
- Tubulipora tuba*, O'DONOGHUE and O'DONOGHUE, 1926, Contr. Canad. Biol. Fish., n. s., vol. 3, no. 3, pp. 70, 71.
- Tubulipora tuba*, OSBURN, 1953, Allan Hancock Pac. Expd., vol. 14, no. 3, pp. 650, pl. 68, fig. 9.

DESCRIPTION: Zoaria inerusting. Zooecia tubular, erect, arranged monoserially or biserially, with many tubes. Ovicells globose, spreading among two or three series of tubes. Ooeciostome short, tubular, erect, located near first zooecial tube of series.

MEASUREMENTS: Diameter peristome, 126 $m\mu$. Diameter aperture, 70 $m\mu$.

LOCALITIES: Bath-house Beach, Santa Barbara, California, Pleistocene. West Second and Pacific Avenue, San Pedro, California, Pleistocene.

OCCURRENCE: *Pleistocene*: Santa Barbara, California (Gabb and Horn, 1862); Santa Monica, Santa Barbara, Dead Man's Island, San Pedro [harbor], California (Canu and Bassler, 1923). *Recent*: California (Robertson, 1910); Vancouver Island region (O'Donoghue and O'Donoghue, 1923, 1926); Puget Sound (Robertson, 1910, O'Donoghue and O'Donoghue, 1925); Hancock stations, Channel Islands.

DEPTH: 4 to 81 fathoms (9 records).

***Tubulipora tuba* var. *fasciculifera* (Hincks), 1884.**

Tubulipora fasciculifera HINCKS, 1884, Ann. Mag. Nat. Hist., ser. 5, vol. 13, pl. 9, fig. 6.

Tubulipora occidentalis ROBERTSON, 1910, (*pars*), Univ. Calif. Pub. Zool., vol. 6, no. 12, p. 249, pl. 22, figs. 29-31.

Tubulipora fasciculifera, CANU and BASSLER, 1923, U. S. Nat. Mus. Bull. 125, p. 197, pl. 42, figs. 9-17.

Tubulipora fasciculifera, O'DONOGHUE and O'DONOGHUE, 1923, Contr. Canad. Biol., n. s., vol. 1, no. 10, p. 150.

Tubulipora fasciculifera, O'DONOGHUE and O'DONOGHUE, 1925, Univ. Wash., Pub. Puget Snd. Biol. Sta., Trans., vol. 5, p. 95.

Tubulipora fasciculifera, O'DONOGHUE and O'DONOGHUE, 1926, Contr. Canad. Biol. Fish., n. s., vol. 3, no. 3, p. 70.

Tubulipora tuba var. *fasciculifera*, OSBURN, 1953, Allan Hancock Pac. Expt., vol. 14, no. 3, pp. 651, 652, pl. 68, fig. 10.

DESCRIPTION: Zoaria flat, incrusting, our specimens fragmentary. Zooecia tubular, radiating, erect, free, arranged monoserially or biserially with few tubes. Ovicells small, placed among the rows of zoecial tubes. Our specimens do not show intact ooeiostomes.

MEASUREMENTS: Diameter peristome, 138 $m\mu$.

LOCALITIES: Bath-house Beach, Santa Barbara, California, Pleistocene. LACMIP loc. 66-2, Newport Harbor mesa, Newport, California, Pleistocene.

OCCURRENCE: *Pleistocene*: Santa Barbara, California (Canu and Bassler, 1923). *Recent*: *Pacific*: Queen Charlotte Islands (Hincks, 1884); Vancouver Island region (O'Donoghue and O'Donoghue, 1923, 1926); Puget Sound (O'Donoghue and O'Donoghue, 1925); Hancock stations, California, Channel Islands.

DEPTH: 8 to 131 fathoms (16 records).

Division II, **ARTICULATA** Busk, 1859

Family CRISIIDAE Johnston, 1838

Genus **Crisia** Lamouroux, 1812**Crisia serrulata** Osburn, 1953.

Crisia serrulata OSBURN, 1953, Allan Hancock Pac. Exped., vol. 14, no. 3, pp. 679, 680, pl. 72, fig. 2.

Crisina serrata GABB and HORN, 1862, Jour. Acad. Nat. Sci., Phila., ser. 2, vol. 5, pt. 2, pp. 174, 175, pl. 21, fig. 66.

Crisia pacifica ROBERTSON, 1910, Univ. Calif. Pub. Zool., vol. 6, no. 12, pp. 242, 243, pl. 20, figs. 16, 17.

Crisia serrata, CANU and BASSLER, 1923, U. S. Nat. Mus. Bull., 125, pp. 196, 197, pl. 42, figs 1-7.

Crisia pacifica, O'DONOGHUE and O'DONOGHUE, 1923, Contr. Canad. Biol., n. s., vol. 1, p. 149.

Crisia serrata, O'DONOGHUE and O'DONOGHUE, 1926, Contr. Canad. Biol., Fish., n. s., vol. 3, no. 3, p. 64.

DESCRIPTION: Zoaria calcareous, erect, with a low longitudinal keel along the mid-dorsal line. Zooecia tubular, connate. Ovicell prominent, adhering in its entire length to the ventral zoarial wall.

MEASUREMENTS: Diameter peristome, 103 μ . Diameter aperture, 92 μ . Diameter zooecia, 138 μ .

LOCALITIES: Bath-house Beach, Santa Barbara, California, Pleistocene. West Second and Pacific Avenue, San Pedro, California, Pleistocene.

OCCURRENCE: *Pleistocene*: Santa Barbara, California (Gabb and Horn, 1862); Santa Barbara, Santa Monica, California (Canu and Bassler, 1923). *Recent*: California (Robertson, 1910); Vancouver Island region (O'Donoghue and O'Donoghue, 1923, 1926); Hancock stations, Oregon, California, Channel Islands, Gulf of California, Mexico, Galapagos Islands.

DEPTH: 8 to 86 fathoms (26 records).

SUMMARY

In reviewing the material covered in this report, we find that of 56 species of Bryozoa noted, the following 19 have not previously been reported from the fossil record: *Conopeum commensale* Kirkpatrick and Metzelaar, 1922; *Antropora tinctoria* (Hastings), 1930; *Microporina borealis* (Busk), 1855; *Labioporella sinuosa* Osburn, 1940; *Thalamoporella californica* (Levinsen), 1909; *Amastigia rudis* Busk, 1852; *Scrupocellaria regularis*

Osburn, 1940; *Scrupocellaria varians* Hincks, 1882; *Hippopodina feegeensis* (Busk), 1884; *Schizoporella linearis inarmata* (Hincks), 1884; *Schizomavella auriculata cuspidata* (Hincks), 1880; *Hippodiplosia insculpta* (Hincks), 1882; *Hippoporella gorgonensis* Hastings, 1930; *Parasmittina californica* (Robertson), 1908; *Parasmittina collifera* (Robertson), 1908; *Mucronella microstoma* (Norman), 1864; *Rhynchozoon tumulosum* (Hincks), 1882; *Hippopodinella adpressa* (Busk), 1854; *Holoporella brunnea* (Hincks), 1884. In addition to those listed above, we have recorded another 10 species that have been reported from the fossil record prior to this time, but not from the Pacific coast of America. Finally, there are 4 species, namely, *Schizomavella auriculata cuspidata* (Hincks), 1880; *Hippoporidra edax* (Busk), 1859; *Mucronella microstoma* (Norman) 1864; and *Filisparsa clarki* Canu and Bassler, 1923, that are as yet unreported as living forms from the waters of the Pacific coast of North America.

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